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MOZAMBIQUE

ITS AGRICULTURAL DEVELOPMENT

AMERICAN TOBACCO AT UMBELURI.

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MOZAMBIQUE · ITS AGRICULTURAL DEVELOPMENT

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WITH A MAP AND 16 ILLUSTRATIONS

T. FISHER UNWIN

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TO

MY COUSIN,

EDWARD REGINALD CHUDLEIGH,

OF CORNWALL, ENGLAND;

A PIONEER OF NEW ZEALAND.

WITH AFFECTIONATE MEMORIES.

OF PLANTATIONS

Plantations make mankind broader, as generation makes it thicker.

Let the prime undertakers be men of no shallow heads, nor narrow fortunes.

Let the planters be honest, skilful, and painful people. Nor must the planters be only honest, but industrious also. What hope is there that they who were drones at home will be bees abroad.

Let it have a self-sufficiency, or some staple commodity to balance traffic with other countries. As for a self-sufficiency, few countries can stand alone.

Let the planters labour to be loved and feared of the natives. With whom let them use all just bargaining: keeping all covenants, performing all promises with them.

THOMAS FULLER.

PREFACE

With the exception of the case of the clove industry of Zanzibar, which has been carried on by the Arabs for nearly a hundred years, agriculture on the east coast of Africa is in its infancy. This is especially so in Portuguese East Africa. Hence no handbook of the agriculture of that country with any pretence to authority could as yet be written, and this book lays no claim to be such. It is an epitome of the conclusions come to after an eighteen months' examination of the territory and its agricultural resources and prospects, and an attempt to reveal Portuguese East Africa to the investor; that and no more. The tropics are centuries behind the temperate climates in systematic agriculture, and as nature yields up her secrets grudgingly, progress must necessarily be slow with new products among a new people in a new country.

It has been necessary to travel beyond the limits of agriculture proper, and the views expressed on some of the questions I have discussed,

for example natives and labour, are convictions formed after many years' experience and study. Successful planting in East Africa does not depend solely upon the quality of the soil.

I hope I may have done something in the last chapter to dispel the doubt about security of land tenure in Mozambique. I never heard of any one whose titles were in order losing a square yard of ground. The trouble with Portuguese East Africa, as I have there explained, is the obstructing fiscal system and monopolies. In drawing attention to that I know that I shall earn the approval of the Portuguese of the Province themselves, with many of whom, earnestly labouring for the advancement of the country, I have discussed these questions.

During the period in which I had the privilege of serving in the Government of the Province of Mozambique as Director of Agriculture I enjoyed the friendship of many Portuguese, colleagues in the Government and others, who, if they read these lines, will I hope permit me to express in them my deep and sincere gratitude for many kindnesses received at their hands and my appreciation of that never-failing courtesy for which the race is famous. Among them I must name Captain Cardozo, late Governor of Inhambane, and Captain Cunha, Capitao-Mor of Mossuril.

To my own countrymen who are bearing their share of the burden of Mozambique, no mean share be it said, I am also under many obligations which to acknowledge in full would occupy many pages. But though brevity is imposed on me I cannot refrain from mentioning Mr. Sam Goldsbury of Umbeluzi, Mr. F. A. Zurcher, late Government Agrostologist, Quelimane, Mr. W. H. Charter and Mr. Nicol of the Zambezia Company, Mr. N. C. T. Harper of Chinavane, and Mr. Pecastaing of Mutamba, Inhambane, whom I will include in this category. I have also to thank Mr. James Munro, who gave me permission to include in this work the translation of the land law for the Province of Mozambique.

Mr. Frank Adams, M.A., late Sub-Warden of Glenalmond, places me again in his debt for having kindly read through the manuscripts.

R. N. L.

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MOZAMBIQUE

CHAPTER I

SOME NATURAL ADVANTAGES IN WHICH THE PROVINCE EXCELS

Politics loom so large in the South African sky that the value of Portuguese East Africa has come to be identified with the value of Delagoa Bay as a port for Johannesburg, but whatever store may be set upon the privilege of being able to play the part of a Tilbury to the Transvaal, merely to fetch and carry for other people, however efficiently, is a poor ideal for any country. Mozambique is destined for greater things than to be one of the doorways of South Africa.

A glance at the map for the first essential condition of successful agriculture—namely, water—reveals the wonderful system of rivers with which Portuguese East Africa is endowed. The whole of the great plateau of Central and South Africa, east of the divide which separates the

Congo and Zambezi basins, is drained into the Province. Six rivers, including the Incomati, rising in the heart of the Transvaal, converge upon Delagoa Bay, and between Lourenzo Marques and the Zambezi there are the basins of the Limpopo and Sabi and innumerable smaller streams emptying themselves into the Mozambique channel. The Zambezi, herself the Queen of East Africa rivers, after traversing the Province for between 500 and 600 miles, forces its way to the coast through a maze of estuaries, forming one huge delta 100 miles wide. Northward, though there is no river of the size of the Limpopo, the multiplication of streams, large and small, continues to the boundary.

The rivers are not torrential, rushing along deep defiles, but flow lazily through valleys which they themselves have built up with the rich alluvial deposits borne upon their waters. The land thus made is easily irrigated, and this is one reason why capitalists are now being attracted to the country. They are realizing the great facilities for irrigation which it possesses, irrigation being often the determining factor, in these times of competition and intensive cultivation, of successful management.

The great obstacle to rapid progress in young countries is often the difficulty of communication

and transport. British East Africa is specially handicapped in this respect. The development of the fertile plateaux, now being rapidly occupied by white settlers, must inevitably suffer through the fact that all their produce has to pass over a single-line railway 300 miles long before it can reach the coast. Mwezi, the richest part of German East Africa, has the Uganda Railway for its only outlet also, and even when the Dar es Salaam-Tabora line is built it will still have the disadvantage of costly railway communication to contend with.

The circumstances of Portuguese East Africa present in this respect a striking contrast. The fertile centres are near the coast, and its rivers are navigable, so that independently of its railway tapping different parts of the interior, the country in its navigable rivers and its enormous stretch of seaboard is particularly favoured.

The Province is again well placed as regards markets. The tropical countries of Africa are dependent upon Europe for their market, and in the case of German and British East Africa this is reached through the Suez Canal, which, with its heavy tolls, added to the cost of railway transport, constitutes a severe handicap. Portuguese East Africa, on the other hand, is served by several steamship lines working round the

Cape. It is, however, to a certain extent independent of Europe, as it possesses in the Union a miniature Europe as a near neighbour. This is bound in the future to have a marked effect both with small capitalists who look for quick returns, and with large capitalists who, in ever-increasing numbers, cater for the great mining capital and other industrial centres of the Union. Any advance in progress on the part of Rhodesia and Nyasaland must also be shared to some extent by the Province, which connects them with the coast, their natural outlet. On the other side of the channel stretches the great island continent of Madagascar, bound in time to render up its riches, when it will provide Mozambique with still another market to exploit.

The agricultural resources are as yet little known, though it will be easily understood that a country stretching through sixteen degrees of latitude, abounding in well-watered alluvial plains, and enjoying both a tropical and a sub-tropical climate, must have great and varied capabilities.

Portuguese East Africa is known officially as the Province of Mozambique, and is governed by three separate administrations, two of them being company administrations, independent of the Governor-General. The northern portion, between the Rivers Rovuma, on the German East Africa

frontier, and the Lurio, is the Nyasa Company's territory; from the River Zambezi southwards to the 22nd parallel is the territory of the Mozambique Company; the rest of the country, consisting of the districts of Mozambique, Quelimane, and Tete in the north, and of Inhambane and Lourenzo Marques in the south, is administered by the Governor-General of the Province of Mozambique, who resides in the town of Lourenzo Marques.

The following chapters are devoted to that part of the country administered directly by the Governor-General, though reference will be made from time to time to the Companies' territories.

A word is necessary to explain the various designations, five in number, for which the word Mozambique serves. They may be set forth thus:—

1. The Province of *Mozambique*.
2. The *Mozambique* Company's Territory.
3. The district of *Mozambique*, of which
4. The town of *Mozambique* is the capital.
5. Finally, the word *Mozambique* by itself is often used for short when referring to the whole Province.

The recurrence of the same word for different territorial applications leads to much confusion.

CHAPTER II

THE SAND-DUNES OF THE LITTORAL

A STUDY of the conformation of the east coast of Africa reveals a curious repetition of outline. It is a succession of bulges and bights, shrinking in dimensions as we proceed southwards. From Cape Guardafui one great westward sweep culminates at Saandani, opposite Zanzibar. From there the coast curves boldly outwards to Mozambique, and then gives again to Sofala. At Inhambane and Delagoa Bay, St. Lucia Bay and the Tugela, the bulge and bight are twice again repeated, and then disappear. This coincidence of contour in so far as the Province of Mozambique is concerned is, I think, capable of explanation by a study of the effects of the natural forces now at work, and which have been at work doubtless for ages past.

The great rivers of the Province have, of course, been important instruments of architecture, and have built themselves enormous alluvial plains through which they now flow with leisurely

current. The delta of the Zambezi, if we count it as beginning at the junction of the Quaqua River, is nearly 100 miles long; but it is rather a remarkable fact that, unlike some other great rivers of Africa, the Nile and Niger, for example, the delta does not project into the sea, but is tucked away in a bight. The same may be said of the Rivers Lycungo, Buzi, Sabi, Limpopo, and Incomati. On the other hand, at the two great shoulders of Mozambique and Inhambane we find no larger rivers emerging. The explanation of this may be that the curves of the coast-line were at one time very much more pronounced than they are at present, and that the rivers, by the accumulation of silt, are overtaking the flanking convexities, and will eventually succeed in straightening out the inequalities. This explanation might serve to explain one group of phenomena if it stood by itself, but it does not explain the remarkable repetition, nor does it help us to understand how the shoulders come to be there, and why they are both dry.

The true explanation is, I think, that while the rivers have been busy prolonging their banks, the forelands are being built up even faster. It is a race oceanwards, and the forelands are winning.

The littoral of the Mozambique coast is in the main of sand-dune formation. The prevailing

winds are from the east—north-east or south-east —and nearly every afternoon the sea-breeze, refreshing to exhausted humanity, begins to blow again and renew its task of construction. The dunes and inland hills, so far as this sandy formation extends, are all parallel to the coast, clearly indicating their marine origin. The process can be observed in operation at the present day. Every wave that breaks upon the shore is charged with sand in suspension. The momentary pause before the wave begins to recede allows of sufficient time for some of this sand to settle to the bottom. The surface of the beach is billowed with miniature sand furrows caused by the retreating waters carrying back with them a little way the newly deposited sand. These furrows, a familiar feature of the beach, beautiful in their regularity, though never monotonous, play an important part in the scheme of architecture, as they constitute barriers over which the last escaping remnant of the retreating wave, left in the lurch as it were, cannot flow. Enfeebled in force and reduced in volume, it hurries away right and left, leaving its sand behind. The escarpments of these little furrows face the sea as they are formed by the returning waves, which, baffled in their attempts to surmount the miniature dunes, fall back and scour out another course for themselves.

The waves having performed their task of bringing the sand to the threshold, the tide takes up the work of preparing the sand for the action of the wind, the second transporting agent. The waves maintain their dominion over the sand till the highest spring tide is reached. After that a margin is left along the flat beach, increasing daily in width as the limit of high-water mark recedes. Under the influence of the burning sun the surface moisture of this margin soon evaporates, and when dry the sand is caught up by the prevailing sea-breeze and blown in a perpetual drift landwards.

The density of this sand-cloud varies, of course, with the velocity of the wind, but in a normal summer breeze it is quite considerable, and can be detected to a depth of about three feet from the surface. The imagination, while it cannot span the ages through which this drift has been in progress nor grasp the extent of the mighty monuments it has reared, yet is able to realize what in fact has been taking place and what is now going on.

Having escaped from the caverns of the deep, the sand is not suffered to go very far in its flight, for it is quickly arrested and imprisoned by the vegetation of the land, which slowly yet persistently reaches out ever farther and farther

to garner the harvest of the sea. At first it is a struggle between them ; the creeping plants advancing to anchor themselves in the shifting sands often to perish, though, through their reserves, ultimately to prevail. During the contest the opposing forces have piled up between them a sand-dune.

Sometimes the dune thus formed takes the form of a long tongue of sand or island behind which the sea penetrates. In the course of time this newly formed bank effects a junction with a neighbouring accumulation, and the intruding water of the ocean becomes imprisoned. This would seem to be the origin of the numerous brackish lakes in the district of Inhambane. The course of the Incomati and that of several other rivers which take a turn and run parallel to the coast before entering the sea have been manifestly influenced by these sand barriers.

The scour caused by the great rivers accounts for the slow accumulation of sand near their mouths, the currents being a disturbing element and interrupting the work of the waves and the wind. Sand brought down from the remote interior and subsiding forms bars and shoals and banks. Some of it is carried away by the tide drift and the Mozambique current, providing the waves and the wind with material for their work

of building up the dunes and inducing the coast-line ever seawards.

The sand-dunes rising from the seashore are dry, white, and devoid of humus; unsuitable for the cocoanut-palm. Behind the dunes, marshy flats, once lake bottoms, and now often water-logged in the wet season, frequently occur, upon which no tree growth of any kind will flourish. If the sand-dunes were but flattened out over the swamps we might have ideal cocoanut land. As it is, large stretches of the coastal belt of the Province that could perhaps have carried millions of cocoanut-trees are barren.

This girdle of sand-dunes gives us the key to the character of the soil throughout a large part of the Province. The intrusive granite, which forms the great barrier behind the sand, reaches in a drift of mountainous peaks almost to the coast-line in the district of Mozambique. Two of these peaks, one called Mount Meza (table) and the other Mount Pao (bread), are very conspicuous, and serve as a landmark for mariners making the port of Mozambique; the position of the ship being defined when, as it is said, the bread is on the table. Through the defiles of these granite highlands course innumerable streams collecting particles of the disintegrated rock for building up the rich alluvium of the river-banks.

CHAPTER III

THE MOZAMBIQUE DISTRICT

The object of this book being to provide a study for the intending settler and investor rather than for the geographist, it will be more convenient now to follow the administrative units, especially as these have to some extent been defined by natural boundaries.

That portion of the country north of the Zambezi is watered by two river systems which divide the districts of Quelimane and Mozambique into two regions, one of them near the coast being a region of no running water. The mountains to the east of Lakes Nyassa and Shirwa form the watershed of one system, which spreads out like a great arch, one half having its base northward on the River Rovuma, the other southward in Quelimane. The rainfall in these highlands is probably 70 inches, perhaps more, and as a result both the tributaries that feed the Rovuma and Lurio and the rivers of Quelimane are

SALT-PANS, ANGOCHE.

always running and flow through bountiful lands.

The region of no running water is defined by a range of hills about 120 miles from the coast, from which a number of streams flow straight into the sea. The rainfall of this region being less than 30 inches, these rivers flow in the wet season only—are indeed but mountain torrents, which dry up in the dry season, when they are most wanted. The Lurio and the Lygonha, arising in the highlands behind, penetrate with brimming banks this arid zone, with which they have no part, and form the boundaries of the administrative district of Mozambique.

With the exception of a narrow fringe of crystalline limestone at the coast, the formation of the district is granite; the soil changing rapidly from light-grey sandy to red loam, the latter being the richer and preferred by natives for their clearings.

A tropical country with a rainfall of less than 30 inches only just escapes being a desert. Cocoanuts produce scanty crops, and, except in a few favoured spots at Angoche, such as the low sandy flats in the estuaries of the rivers, just high enough to escape inundation by the high tide, or particularly retentive red soils bordering upon mangrove, cocoanuts can be

ruled out as a commercial proposition for Mozambique.

Practically the whole of the dry region and the greater part of the country beyond is forest clad. It is inhabited by the Makua, whose villages cluster round the lakes in the otherwise dry water-courses and wells. The region of the Lurio is populous, and this river, as yet unexplored by the planter, must possess rich possibilities for the future. I shall return to the consideration of this dry region when treating of cotton, but one important feature yet remains to be noted. Good hard forest roads of easy gradients descending with a gradual slope to the sea can be made across it to carry motor traffic from the fertile Trans-Chinga to the coast. Some already exist, and the administration will soon have motor-cars running over them.

The country beyond the Chinga Range, which forms part of the divide and which I allude to as the Trans-Chinga, is also of granite formation, but has richer soil and a higher rainfall than the dry belt, and though some of the tributaries that feed the Lurio dry up, it is only for about two months, and not all do so. Some of the natives of this part of the district being still hostile, the country is scarcely yet open for

settlement, though the Portuguese by peaceful penetration keep extending their outposts, and in a very short time the Trans-Chinga comprised within the great fertile arch of Quelimane and Nyassa should be ready for the planter.

CHAPTER IV

DISTRICT OF QUELIMANE—THE PRODUCTIVE ZONES AND RIVER ZAMBEZI

No part of East Africa with which I am acquainted can compare in fertility with the district of Quelimane. It is the garden of the coast, and for the planter is perhaps worth more than all the rest of the Province put together. Three circumstances contribute to give it its value, the most important being the rainfall, which is between 50 and 60 inches, rising to 60 or 70 in the highlands behind. Zanzibar and Pemba are the only places on the coast which have a greater rainfall. Towards the eastern administrative boundary a few storm-water torrents drain the low range of hills which form part of the Chinga system, but with the exception of these the rivers of Quelimane do not dry up. They intersect the country in every direction as racing rivulets or bountiful streams like the Lugella and Lycungo, the Lualua

and Rio dos Bons Signaes (river of good omens), the Liquare and Quaqua, the Inhamacurra and Macuse, the Maballa, the Raraga. There is nothing in East Africa that can rival this river system of Quelimane, providing not only great possibilities for irrigation but also valuable facilities for transport and shipping. The third determining factor of the fertility of the country is its soil.

Fringing the coast we have, as we should expect, a strip of land destined in places to come under cocoanut cultivation. This strip is approximately 400 kilometres in length from boundary to boundary, and over some 150 kilometres of this, that is to say, from the mouth of the Zambezi to the Maballa River, cocoanut-trees have already been planted intermittently. It is a matter of some uncertainty how far inland cocoanuts can profitably be cultivated, as the productiveness of the palm begins to decline rapidly as soon as we get away from the influence of the sea, but I think 10 kilometres may safely be assigned as the profitable productive limit. The soil in this zone differs considerably in character, following the contours of the land, the changes being frequent from dry, sandy soil on the ridges to wet, argillaceous swamps in the depressions. The frequency of these swamps,

which even when drained make poor cocoanut country, detracts very considerably from the value of the Quelimane district for the production of copra.

The coastal belt is backed behind by a second zone, composed largely of wet clay, frequently waterlogged and swampy, large areas being under water in the rainy season. It rises by a succession of ledges, a formation well adapted for both irrigation and drainage, especially as it is well served by rivers. The swamp bottoms of rich argillaceous loam would make good sugar land if drained. This zone is very irregular in shape, here and there penetrating to the coast, its interior outline taking the form of large sweeps or bays, but its mean width may be set down at about 50 kilometres. Lake Rigoria, near Villa Joao Coutinho, and Inhamacurra are both near the line of demarcation between this zone and the third. Opposite the town of Quelimane the deposit takes a sweep inland behind the delta of the Zambezi, and outcrops at intervals at that river.

We now leave the alluvium of the *bara*, but before entering the fertile uplands we cross a sandy fringe expanding into a large wing in the direction of the Chire River, and into another wing towards the Mozambique boundary, present-

ing an outline very much like that of a butterfly, with its body in the neighbourhood of Villa Joao Coutinho, where the strip is about 15 kilometres wide. In the region of the "body," and for a considerable distance on either side, the soil is productive and would carry many other crops besides agave, but the wings are less fertile. I call this the agave zone, because sisal will probably be found to do better here than at the coast, where the excess of moisture might reduce the quality and percentage of fibre; or on the higher elevations inland, where the cold weather would check the growth and produce a fibre of short staple. Sisal hemp, yielding from 3 to 3½ percentage of fibre of good length and quality, is now being produced on this land and has been described by the brokers of Mincing Lane as the finest sample of sisal hemp they have ever seen.

The heart of the interior of the Quelimane district beginning, roughly, at a point 75 kilometres from the coast and extending from there for a distance of some 125 kilometres with a width of perhaps 150 kilometres north-east and south-west, is a forest-clad country with an undulating surface, scored by innumerable streams, where the granite matrix frequently protrudes. Great bosses of granite, soaring into mountainous peaks, thrust

through at intervals, giving the landscape a weird, primeval appearance. The forest is broken here and there by native clearings, some of them abandoned, others supporting a fairly large population. Most of the ordinary tropical products, such as manioc, pigeon peas, groundnuts, sweet potatoes, yams of enormous size, citrus, cashew, bananas, tobacco, turmeric, tanniers, castor-oil, and sesame, are cultivated in these gardens. The soil in some places is a black organic wash, in others a brown or chocolate loam, and in others a light sandy loam. The proportion of clay is sufficient to make it retentive of moisture, but not enough to render it impervious or waterlogged. Now and then one meets with gravel or stone, though not in any great quantity.

Three plantations of Ceara rubber aggregating a million trees or more, have been planted in different parts of this zone. At the time of writing none of them has been worked, and therefore we cannot yet definitely state whether Ceara rubber will pay to cultivate on this land; but the appearance of the trees is such as to encourage the belief that it will. Experimental tappings have been made and the results recorded compare favourably with results obtained in German East Africa. If, as is to be hoped, the

product turns out a paying proposition, considerably over a million hectares of land can be put under rubber.

An elevation will be reached eventually beyond which rubber will probably not pay to grow, when it will give way to maize, cotton, tobacco, and tropical and sub-tropical products that prefer a less forcing climate than that near the coast. Some of the country would probably prove congenial for ostrich-farming, but cattle-rearing will depend in some measure upon the extent to which tsetse is found to exist. The settlement of these highlands awaits the opening up of roads and the bettering of the means of transport.

I have not visited the Nyassa Company's territory, but I feel sure that the western portion from the River Lugenda to Lake Nyassa, the basin of the tributaries of the Rovuma, and comprising the northern part of the arch of which the rivers of Quelimane form the southern, must be good country.

The River Zambezi is pre-eminently associated with the sugar-planting industry of the Province, and it goes almost without saying that under favourable conditions the industry on that river and the Chire would be capable of immense expansion. At the same time it would be quite a mistake to suppose that the land along its banks

is all good sugar land; indeed the greater portion of the land through which the river passes from the junction of the Chire to the muddy mangrove flats of the lower delta is too sandy to be classed as good sugar land, but rich argillaceous deposits occur, and their united areas must be considerable.

This sandy formation, apart from its direct bearing upon the fertility of the soil, is the origin of physical effects of some importance to agriculture. The banks are continually crumbling away, and the bed of the river is becoming ever wider and wider. This is in contrast to the Incomati, whose banks, mainly composed of alluvium and organic matter, not subject to scour like sand, and protected by a thick growth of reeds and creeping aquatic grasses which encroach upon the water, are, it would seem, contracting, and the river, now confined within narrow limits, is probably but a shiver of what it once was. These conditions are favourable for irrigation, because instead of a wide shoaling stream like that of the Zambezi we have a single deep channel. But, on the other hand, it is obvious that a swollen stream, cramped up within a narrowing bed, is much more likely to overflow and seriously inundate the adjacent lands than one that is always extending its boundaries.

Permanent irrigation pumps can only be estab-

lished on banks liable to slide by protecting them with substantial masonry, but in preference to undergoing the expense this would involve, sugar-planters on the Zambezi use pumps temporarily fixed and driven by portable engines. Pumping is only practicable when the banks go straight down into the water, but on the Zambezi it may happen that after the flood-time of the rainy season a sandy flat has accumulated between the bank and the stream, diverting the latter to the opposite side, and that pipes which before dipped into the water now dip into sand. Pumps have then to be removed to another place, because such is the volume of the sand drift during the strong easterly winds of the afternoon that piping carried across the sand spit would soon get buried, entailing subsequent expense in excavating them before the floods set in again.

We find very different conditions on the River Chire. Instead of, as the Zambezi, a swift destroying stream wandering from side to side of a huge waterway, and concealing treacherous shoals, the Chire fills its narrow bed with a sluggish current of deep water. On the triangular island of Inhangoma, 160,000 acres in extent, formed by the junction of the two rivers with a connecting stream at the base, the conditions for sugar-planting are very favourable.

The land in many parts is rich; the banks of the river go straight down to deep water; the country to the north, in Portuguese and British territory, is populous and should provide adequate labour for certainly a limited number of factories; and the way out to the ocean liners is to be made easy over the projected Port Herald–Beira railway. It is somewhat surprising to find the Chire, which undoubtedly possesses great possibilities for sugar, so long neglected.

Agriculture on the Zambezi is, for the present, developing along the lines of sugar, cotton, cattle, and tobacco. Sisal hemp and Ceara rubber, the latter perhaps under irrigation, may also be expected in the future to claim a place in the sun. It is not a country for small settlers, unless grouped together in one fertile locality where they could co-operate in employing labour-saving machinery and central factories. It is essentially the country of the capitalist and the steam-plough. The latent resources are enormous, but judgment and discrimination should be exercised in the selection of land, the choice and cultivation of crops, and above all measures secured for providing an adequate supply of labour.

CHAPTER V

MARITIME FORMATION OF THE DISTRICT OF INHAMBANE

I pass over Tete because I cannot speak of it from personal experience. It has a reputation for being a dry, rocky country. Probably good land is to be found in the Angoni country, but Tete is remote from the coast and the planter is not likely to trouble it till he is crowded out of the fertile regions nearer the sea and civilization—an eventuality not yet within sight.

The district of Inhambane, like that of Mozambique, is capable of division into two well-defined areas, the positions in this case, however, being reversed as the fertile strip borders the coast. Roughly we may draw an imaginary line from just below Cape Burra Falsa inland for 50 miles and then south-west parallel to the coast. This encloses the south-east corner of the district, and within this enclosure, which is fairly well watered by small

streams, the bulk of the population lives. West and north of this is waterless forest possessing no attractions for the native or the European settler, though some for the rubber concessioner.

The formation of this fertile strip is maritime, and consists of sand-dunes separated by lakes, streams, or dry valleys where black alluvium, known locally as *mashonga*, accumulates. This mashonga is sometimes a mixture of clay and loam or clay and humus, at others almost pure grey clay, and less frequently humus alone to a depth of a foot or more. Excepting where there is an excess of humus rendering the land sour, the mashonga is good sugar land, but it is restricted in area to narrow strips bordering the streams or lake shores. Inhambane can, therefore, never become a great sugar-producing district. It must seek crops suitable to its light sandy formation, which is the characteristic and by far the most prevailing type of soil. This sandy soil varies considerably, and for a proper appreciation of its value it is necessary to distinguish very clearly between the classes, as I observed considerable variation in the vigour of crops growing upon them. There is, first, the white, almost pure, sand, which is not infrequently met with at the east side of the bay and across the Burra Point peninsula. This is

of poor quality, and should be avoided so long as there is better land available. It possesses very little plant-food, but has a great capacity for absorbing the heat of the sun's rays with a corresponding inability to retain moisture. Hence in the dry season it gets parched up. On the Maxixe side of the bay, as soon as the coast is left behind, the soil is a light red sandy loam. The shades of red differ, but it may be taken as representing a fair indication of quality that the darker the colour the better the soil. The colour seems to deepen as the tops of the low hills are reached. Between this red sandy soil and the mashonga at the bottom there is frequently a strip of whitish sand, much inferior in quality. In the direction of Inharrime a grey sandy loam is found, and it is upon this soil that the Inharrime tobacco is largely grown. There are no rich loams in Inhambane, nor heavy clay soils except the mashonga, which is too wet for most crops. The land is light, the drainage good, the elevation low.

CHAPTER VI

FOREST AND DALE IN LOURENZO MARQUES

It is a little unfortunate that the railway over which passengers travel to and from the Transvaal should pass through such an uninviting strip of territory after crossing the frontier as that between Ressano Garcia and Lourenzo Marques. The view obtained is apt to give one the impression that all the country is of that character. But this idea is erroneous. There are uninhabited plains and forests but also populous valleys.

The Incomati, seen from the train, is typical of several other rivers that give to the district of Lourenzo Marques its characteristic features of forest and dale.

For a distance of some 135 miles, following the windings of the river from its mouth at Delagoa Bay, the Incomati flows through a low alluvial plain. At Manhica, 80 miles from Lourenzo Marques, a good view of part of this

plain is obtained from the summit of the cliff, which at this point forms the right bank, rising almost perpendicularly out of the river to an elevation of some 60 metres above sea-level. Ten to fifteen miles to the eastward the limit of the plain is defined by a low line of hills, sand-dunes separating it from the coast. The Incomati, a slender silver streak, lost in the distance to north and south and threading its way through this enormous flat, presents but a very insufficient agent to have accumulated so much alluvium, even when we allow it long geological ages in which to have worked. The course of the river being turned parallel to the coast suggests that the plain had once been an arm of the sea, and the existence of brackish lakes scattered about confirms this view. When the original outlet of the river became silted up, diverting its course and shutting out the sea, a great lagoon would be formed, afterwards becoming a morass and swampy plain as we see it now. At Manhica the river overflows its banks, flooding the plain to a depth of 2 or 3 feet once in every four or five years, the water remaining about six weeks.

It is necessary to have a clear idea of these floods to avoid making mistakes when selecting areas for the cultivation say, of sugar, a crop

that suggests itself as particularly suitable for this character of land. Plants, other than those especially adapted by nature, will not flourish in soil that is waterlogged; hence land liable to be inundated for a period longer than a few days at a time is of little value for agriculture unless it is embanked. A large quantity of the sugar of South America is produced upon low land protected by embankments, and this alluvial plain of the Incomati could no doubt be similarly reclaimed, but the constructing of embankments being expensive work, the reclaiming of swamps is not likely to be seriously considered so long as accessible sugar land is available elsewhere. It is characteristic of the Incomati plain, as of other rivers that have helped to build up their own beds, that the land slopes away from the banks. The reason for this is quite well understood. In a freshet the river becomes charged with alluvium in suspension. So long as the stream is confined within the banks the current is too swift to permit of this alluvium settling, and it is swept along. When the river overflows, the flood-water by reason of the greatly increased friction it encounters is checked in its velocity, and being no longer able to carry its sediment the latter begins to sink to the bottom. Hence the land in the immediate

neighbourhood of the river receives the lion's share of alluvium with each recurring flood, the proportion declining as the river is left. The slope is very gradual, almost imperceptible at first, and it is never suffered to become too steep, because the flood-water, flowing with greater velocity as the fall increases, carries its sediment farther away, thus readjusting the gradient.

The alluvial plain of the Incomati may be said to end (always remembering that we are ascending the river) half-way between Chinavane and Magude, but the River Munetsi (Mwenetsi, Uanotzi), west of Magude, may be taken as roughly the limit to which the Incomati overflows its banks, seriously inundating the adjacent land. Considerable areas of high and dry country are passed at Marracuene, Manhica, between Chinavene and Magude, and at Magude itself. Swampy land again is found here and there above the Munetsi. But to provide for a general classification of the Incomati Valley we may take the Munetsi as marking the floodgate. Following the deviations of the river the junction of this tributary is about 150 miles from Lourenzo Marques.

The land of the alluvial plain suitable for sugar-planting is limited in area, and must be sought,

in the first place, in the upper reaches and along the banks of the river, where, as explained above, it is generally higher and drier. The margin of safety is indicated by a change in the character of the vegetation which the practised eye soon detects. The swamps behind this margin are sometimes capable of being drained, especially if the bend of the river makes a re-entering angle, shortening the distance of the outlet. The existence of a swamp would not, therefore, be sufficient grounds for rejecting a block unless the difficulty of draining it proved to be too great. The soil in these upper reaches is a mixture of clay and loam, exceedingly fertile. The banks of the river are only 6 or 8 feet high, so the water-level, though low enough to permit of the free aeration of the soil and nitrification of the organic matter, is yet well within the reach of the roots of plants which draw their supplies of water by pumping it up from below, not by soaking it in as it descends. While mealie crops in other parts of the district have failed or are wilting for the want of rain, on this soil, the most fertile in the Incomati Valley, they are tall and green and vigorous.

Magude itself, built on a bold intruding bluff, beneath which the shining stream flows tranquilly between wooded banks, overlooks a vast

expanse of forest land, stretching out towards Manhica.

Leaving Magude and continuing the ascent the road passes through rich valleys separated by intervals of dry sandy soils covered with broken forests. At one spot where a limestone outcrop occurs lime is burnt. These valleys are cultivated by the natives, and the crops surpass in excellence anything to be seen in the district except those on the river-banks between Chinavane and Chinasane. They are a tribute to the fertility of the soil and the husbandry of the people. The natives of the Magude district are the best cultivators of any I have seen in East Africa. Generally the African method of cultivating is to till the ground in patches, so that while a lot of land is occupied a little of it is used. This wasteful system, or want of system, is, at bottom, the reason why Europe has appropriated Africa in accordance with the maxim, "The tools to him that can use them." But these Incomati valleys are cultivated as well as any European could cultivate them, the fields of maize being sometimes several hundred acres in extent.

The soil of these valleys is a black or chocolate loam, not so heavy as that of the river-banks in the alluvial plain, having a greater proportion of sand; but the appearance of the crops is con-

clusive evidence that the soil is extraordinarily fertile. The land is dotted about with isolated trees, chiefly ukanya and mafurreira, an indication that no serious flooding takes place. Evidence of the bountifulness of the land is also to be found in the numbers of the people settled upon it. A poor soil cannot support a dense population, and no one is more skilful in discriminating than the African. When he has a choice he will leave, maybe, miles of country deserted, and one can always then suspect something to be wrong even when the signs of infertility are not particularly manifest. Between Magude and Sabie, three tributaries of the Incomati are crossed—the Munetsi, the Nzeli, and the Sabie.

After leaving the alluvial plain extensive tracts of broken forest country extend right away to the *poort*. The soil is dry and sandy, of small value for agriculture proper; but it is clad with verdure, and as pastoral land this broken forest low veld is perfect.

Farther up, the Inhoca and Moamba forests are crossed. Low forests such as these, in country inhabited by cultivating tribes, generally postulate, if not inferior soils, inhospitable surroundings; otherwise, offering as they do no obstacle to the axe, they would have been cleared away by natives for their gardens. Transport is already to

some extent provided for by the Incomati itself, which is navigable throughout its course from Moamba to Marracuene. The stores of Magude are floated down upon its stream. The Government road is used for wheeled traffic, and, except in the wet season, could be traversed by motor. At about half-way along its route the new projected railway from Moamba to Chinavane passes within 1 or 2 kilometres of the river.

This description of the Incomati will serve as far as its main features go for the Maputo, Umleluzi, and Tembe. The estuaries to a distance of 15 to 30 miles are fringed with mangroves backed by low brackish plains, subject to more or less serious inundation.

Farther up rich valleys defined by low forest-clad hills are crossed, becoming less frequent as the rivers are ascended. The Limpopo, the second largest river of Mozambique, must possess enormous possibilities for development above the flooded area. The famous valley, stretching from the hills to the north which divide the district from Inhambane to those to the south dividing it from the alluvial plain of the Incomati, is about 120 miles long with an average width of 35 miles. This magnificent fertile plain has excited the admiration of many people, but in the rainy season it is often one vast sheet of water. In

February, 1909, it was covered with water to a depth of 2½ feet, the water standing for two months. As is the case with the Incomati and other rivers flowing into Delagoa Bay, the land slopes down from the banks so that when the river overflows its banks the water has no escape, the river being itself the only means of drainage. The soil is a black alluvium that shrinks and cracks, the fissures being sometimes large enough to fall into, evidence in itself of the liability of the land to inundation. But for this flooding this Limpopo plain would constitute ideal sugar land, and it is possible that a close examination of the country might discover high ground on which to build factories and, except in very bad years, a way to lead the water back to the river at lower levels.

CHAPTER VII

THE SUGAR-PLANTING INDUSTRY

There are seven sugar-factories at work in the Province of Mozambique: one at Inhambane, two on the Buzi River in the Mozambique Company's territory, three on the River Zambezi, and one at Inhamacurra, Quelimane. There is another small one at Inhambane, but its operations as yet are too small for serious consideration here.

Only approximate figures can be given of the total output of sugar for the year 1911, as they were supplied in each case before the season's crop came to an end; but they represent within a few hundred tons what the actual output of the season amounted to:—

Estate.	Approximate output for 1911. Tons.
1. Mutamba, Inhambane	1,500
2. Inhanguvo, Buzi River	3,100
3. Lusitania, Buzi River	1,700
4. Marromeu, Zambezi River ...	3,500
5. Mopea, Zambezi River	6,500
6. Villa Fontes, Zambezi River ...	11,000
7. Inhamacurra, Quelimane ...	300
Total output for Province ...	27,600

The opening of four more estates is projected—one in the Movene Valley, one on the Incomati, one on the Zambezi, and one on the Chire. The work of preparation has begun on the Movene estate and on the Incomati, and the site has been selected for a new factory at Kowesha, on the left bank of the Zambezi, below Marromeu. The Incomati and Kowesha factories are each to have a capacity of 20,000 tons, that of Movene more. These circumstances, and the increased activity existing factories are now showing, make it probable that by the year 1914 the present output will be at least doubled.

The total number of native labourers employed in growing and manufacturing the sugar is approximately 11,000 men during crop time and a little more than half that number during off-crop time. Crop time is from May to December. The output of sugar per man employed is as follows:—

Inhambane	...	...	...	3 tons per man.
Inhanguvo	...	...	...	3 ,,
Lusitania	...	...	...	2·8 ,,
Zambezi...	...	...	...	2·4 ,,

These are low figures. In Natal, where steam-ploughing is often impossible owing to the hilly nature of the country, and cultivation is all done by hand labour, the output of sugar is 4 tons

per man, and in some cases more. Indian labour is employed there; but when allowance has been made for the greater intelligence of this class of labour as compared with African natives, some economy could certainly be effected on Mozambique estates, especially in field management. It is a point that managers might well look into.

The total area under cane, including new cultivation on estates now working, is some 30,000 acres, but only a portion of this was cropped in 1911. The general practice is to steam-plough and ridge, the furrows being straightened out afterwards by hand. This is a wasteful and expensive system when labour is scarce. A steam-harrowing between ploughing and ridging would tend to reduce the subsequent hand labour, and by improving the tilth increase the yield per acre. The plants are laid flat in the furrow, end to end, covered to a depth of 2 inches, and hilled up gradually during subsequent weedings. In some cases the land is not ploughed at all. The plants are then stuck upright in the ground or at a slight slope. This method is supposed to provide protection against the attack of the borer, which only feeds upon the eyes underground, though some planters assert they have seen borers climbing up the stems to a height of 2 feet. Weeding is done by hand. An

undoubted want, and one to which manufacturers are, it is believed, devoting attention, is a hoe capable of taking three rows of sugar-cane at a time and worked by steam. One of the chief obstacles in working such an implement is the difficulty that would be encountered of moving the wire cable, by which the hoe would be drawn, over the cane ratoons when the hoe was turned round at the headlands. I do not, myself, see at present any way out of this difficulty, as lifting the wire cable over the rows by hand labour distributed up and down the furrows would be both expensive and, I think, inefficient, causing injury to the ratoons.

Between thirty and forty varieties of cane are grown on these estates, the ubiquitous Yuba being found on all of them. It grows like a weed, and ratoons for a much longer period than any other. Some Yuba fields on the Zambezi have given twelve ratoons and are still being cropped. It is adapted to free and open soils, and to land that cannot be irrigated; but on heavy alluvium the more luscious canes give heavier crops and are preferred. Yuba saved the sugar industry of Natal, and with this experience behind them the Yuba school of planters believe it will prove the most profitable all-round cane for Mozambique if cultivated properly. On

no estate in the Province is Yuba receiving the cultivation it properly requires. It demands free drainage and a permanent water-level at some distance below the surface to permit of free scope for its habit of deep rooting. On the other hand, the Yuba school have probably not attached sufficient importance to the fact that much of the sugar land is heavier than that of Natal, is capable of being irrigated, and can support heavier canes. It is a rather difficult cane to establish, being of slow growth as compared with Green Natal, Lusier, and others of that type. It requires, in Natal, from about twenty months to mature and four or five weedings before it closes the lines, which are as a rule 3 feet 6 inches apart. It is planted with the first rains in October or November by laying pieces of cane, each having two or more eyes, in trenches 10 to 15 inches deep and V-shaped in section, and covering with soil to a depth of 2 to 3 inches. It is left to grow until February, when it is earthed up. From fifty to seventy sticks of cane per stool have been cut, and the return of cane per acre has been known in fertile land to reach 70 tons. On soil not too moist its saccharine content is very high as compared with other types, while its prolific ratooning qualities make its subsequent crops very reasonable

in cost as compared with canes which need replanting much earlier. The number of times it will ratoon with profit depends upon the cultivation it receives and the soil. It has been found that Yuba cane can be grown at a profit when other canes will not pay expenses.

On some estates the cane is trashed before cutting; on others it is the practice to cut lines round a block of cane, enough for, say, 1½ day's work, and burn it, the fire cleaning the cane and making it far easier to cut and handle.

The cane being small in diameter, and very hard, requires more powerful machinery for the extraction of the juice. On account of the large proportion of exterior to interior it necessarily follows that much more dirt and foreign matter is found in the juice than is the case with other canes. It also requires a special course of treatment, which, if properly conducted, results in a very fine white sugar being produced.

Practically nothing but Yuba is grown in Natal, and it is fairly safe to say that had Yuba not have been discovered by the Natal planters that two-thirds of the factories in that colony would not exist to-day.

Yuba cane first came into general use in Natal about the year 1895. It is deep-rooted, sending its roots down 10 or 12 feet; preferring

Photo.] [Columbia Expt.

YUBA CANE.

a porous subsoil; the saccharine becoming too watery on a wet clay. In Natal, the cane is left to dry for two months before it is cut for crushing in order that moisture may evaporate from the juice and leave the latter concentrated.

The yield of cane at Inhambane, where Inhambane green is principally grown, is from 25 to 38 tons per acre. In 1910 it averaged 40½ tons; 10 tons 7 kilos of cane producing 1 ton of sugar. This is equivalent to 4 tons of sugar per acre. This little estate, it may be observed, takes high rank in the Province, its records surpassing those of any other. The cost of growing and manufacturing a ton is from £5 10s. to £6.

At Inhanguvo, on the Buzi, 27 fields of cane (Yuba), aggregating 698·22 acres, yielded 38·6 tons of cane and 2·83 tons of sugar per acre. This is at the rate of 1 ton of sugar from 10·3 tons of cane. Two fields only were cultivated between the rows, and these yielded, respectively, 60·9 tons of cane and 4·46 tons of sugar, and 70·8 tons of cane and 5·1 tons of sugar per acre; an example of what can be effected by adopting a higher standard of cultivation.

On the Zambezi one variety, 109 D, gave, from 400 acres, an average of 75 tons per acre.

The mean throughout the river is probably not more than 25 tons of cane and 2 tons of sugar per acre, and the cost per ton between £8 and £9 at the factory.

The following varieties are under cultivation :—

Inhamacurra.—Yuba (principal); red, striped and claret Java; Bourbon; Green Natal.

Mutamba.—Inhambane Green (principal); Yuba (a little); Big Tanna; White Tanna; Nos. 33 and 131; Yellow Tanna; Lusier.

Villa Fontes.—Green Natal (principal); Lusier; 125 D; Yuba; Tanna and other Mauritius varieties.

Mopea.—Green Natal (principal); Lusier.

Marromeu.—Green Natal (principal); Lusier; Yuba; 109 D.

Lusitania.—A native green; a purple (Port Mackay ?, a good cane); Yuba (a little).

Inhanguvo.—Yuba (principal); Green Natal; White Tanna; Striped Tanna; Mauritius 33; No. 87; Lusier; Senville.

Labour is to be the limiting factor to the development of the sugar industry in the Province, and the adoption of labour-saving methods should be the first care of capitalists. The most is certainly not made of irrigation or of cultivation. All resources seem to be directed to increasing the area under cultivation, but if by irrigation, steam cultivation, and scuffling you can increase your yield of cane per acre

from 25 tons to 40 tons, you will increase your output per man and reduce your field expenses in corresponding proportion. It is better to have 3,000 acres yielding 40 tons than 6,000 giving 20 tons per acre. To this extent planters have the remedy of shortage of labour in their own hands. It will naturally seem to some people that labour being the limiting factor recruiting for the mines should be put an end to. This question, however, cannot be dealt with wholesale, but requires examination in detail, and according to the circumstances of each district.

At only one estate in the Province is spirit being manufactured from molasses, namely, at Inhamacurra, where the lessees of the factory are under agreement to distil rum for 60 reis a litre for the Companhia do Boror, who have a monopoly for the sale of the liquor in the district, and retail it for 800 reis a litre. At all other estates except Villa Fontes, where the molasses are mixed with the megass for fuel, it is wasted, the licences for the distillation of spirit being prohibitive. This is an instance where regulations operating against the exploitation of a country's wealth demand revision.

CHAPTER VIII

THE COCOANUT-PLANTING INDUSTRY

About two-thirds of the copra exported from Quelimane, the chief copra-producing district of the Province, is from trees owned by natives or planted by them and purchased by the Prazo companies, some of whom have embarked in extensive planting, though very little of the new planting has as yet come into bearing.

There being no reliable records from which to quote, the only way of arriving at the number of bearing cocoanut-trees in the district of Quelimane is to calculate it from the yield of copra. It becomes necessary, therefore, first to determine the yield of nuts per tree, but for this also there are no proper records. Yields of forty or fifty nuts per tree are given, but these yields are based on what the bearing trees only yield, unproductive trees being left out of account. There is a natural desire on the part of the owners to make their plantations appear in as favourable

a light as possible, but what the practical man wants to know in a plantation in full bearing is in reality the yield per hectare, and this can only be ascertained by taking the average annual crop of nuts and dividing it by the total number of trees, productive and unproductive; the trees being the usual and most convenient unit on which to base calculations in the case of cocoanut plantations. No records such as these being apparently in existence, I can only offer an estimate of the yield, based on such figures as I possess and my observations. I visited one plantation which I was assured was the finest in the district. It contained 124,000 cocoanut-trees, and was planted in 1900. It yielded 450,000 nuts, but there being only 11,000 bearing trees the yield was given as approximately forty nuts per tree. It appeared to me that quite half of the total number had reached the productive age, though, of course, they were not yet in full bearing. But putting this proportion at one-third instead of one-half, the yield per tree comes out at eleven instead of forty. I noticed in this plantation what, indeed, is a feature in all the cocoanut plantations of the district, that a considerable proportion of trees of ripe age were unproductive; but these must be calculated in when computing the output. Working

along these lines, the average yield in the Quelimane district with trees in full bearing may be put down at not more than twenty-five cocoanuts per annum per tree. A margin over this must be allowed for nuts consumed locally, but as this would appear both on the debit and credit side of the present calculation it may be disregarded. It is a low yield, but for the purpose of computing the number of trees that have reached bearing age, which includes unproductive trees and those not yet in full bearing, we cannot reckon upon a general average of more than fifteen. We next have to consider the number of nuts that go to make one kilo of copra.

Besides being a factor in the calculation, this determination will give an idea of the quality of the nuts. Here, fortunately, actual records can be quoted, not over a large number of plantations for several years, as we ought to have to enable us to arrive at a mean value, but yet sufficient to make it unnecessary to rely altogether upon estimates which, however carefully prepared, can never have anything like the value of actual records. The manager of a plantation informed me that in one consignment of his 187 bags containing 8,356 kilos of copra were the product of 57,840 nuts, which

gives 6·9 nuts per kilogramme of copra. We may put it at seven. With good nuts the number of nuts per kilo of copra is about six.

These nuts were, therefore, about 10 per cent. below good average quality. We may deduce from this that the nuts of Quelimane, taking them through, are light in weight; a result that might have been anticipated from the soil and the appearance of the trees. The calculation now works out as follows:—

	Kilos.
Output of copra for the year 1909	3,159,368
Number of nuts made into copra (× 7) ...	22,115,576
Giving number of trees of bearing age (÷ 15)...	1,474,371
Allow an increase of 10 per cent. for 1910 ...	1,621,808

Young trees not yet coming into bearing number about one million, bringing the total in the Quelimane district to-day up to two and a-half million cocoanut-trees.

These calculations, it may be remarked, served to check the yield of nuts. If the yield of nuts is forty per tree, as some maintain, then there are but some 600,000 cocoanut-trees in Quelimane, not counting young ones; if the yield is fifty, then there are half a million trees; numbers that no one would accept.

* *Estatistica do Commercio e Navegaçao*, anno 1909.

The number of cocoanut-trees under cultivation in three of the Prazo companies was stated to be as follows :—

	Cocoanut-trees.
Companhia da Zambezia	389,022
Companhia do Boror...	670,000
Société du Madal	201,129
Total	1,260,151

The new trees are planted 8 metres by 8 metres, a suitable spacing for the country. In some plantations trees have been put 7 metres by 7 metres, but this distance is too close, and has now been given up.

I observed that when planted in the nurseries nuts are sometimes put down 1 foot or more into the ground. This is unnecessarily, in fact injuriously, deep, exhausting the strength of the seed in compelling it to drive its plumule a long distance through the soil before it can begin to breathe and assist in the growth of the plant. A cocoanut requires no watering to germinate; the milk inside provides the requisite moisture. Nature has protected the germ by a thick coating of husk purposely to keep water out, and the nut should not be planted till this husk is bleached and watertight. A seed nut will germinate on the top of the

Photo] [*Gomez, Zanzibar.*

EXAMPLE OF A GOOD COCOANUT-TREE, ZANZIBAR.

Note the drooping leaves shading the trunk.

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ground or hung up in a shed, a method practised in some countries. It is advisable, however, to bury it in the ground, and cover it with soil to a depth of 2 inches to protect it from the sun. Trenches 8 or 9 inches deep will provide for this.

The nuts should be laid in the trench on their sides, or with the tips slightly elevated to throw the milk well back towards the eyes. The spacing in the nursery will depend upon experience and the age at which the young plants are to be planted out.

In Quelimane the nuts are set 1 metre or 2 metres apart in the nurseries; plants of one or two years old being preferred for planting out. At two years old the nut has become absorbed, and no longer offers a bait for the attack of white ants.

The practice of cutting away the lower leaves after the trees have been planted out in the plantation is prevalent in Quelimane, though injurious to the young palms. It is supposed to be done only on roadsides, or to clear telephone wires; but it is the custom of the labourers when cultivating round the base of a young tree to chop off the lower fronds with their hoes, as they are in their way. Thousands of young palms are passed looking starved

and naked; row after row completely stripped of all lower leaves, their growth being thus seriously checked. The leaves of a cocoanut-palm serve several purposes. They are its breathing organs; and if we reduce the breathing capacity of a plant we at the same time reduce its vigour and growth just as certainly as we should reduce the vigour of a man by depriving him of one lung. Another function is to provide shade for the roots in the ground and for the stem above the ground.

Large trees shade one another, but small trees have to protect themselves. It will be easily understood that when the sun is north for the greater part of the year, as at Quelimane, the north side of a young palm gets terribly punished by the sun when the lower leaves are cut away. The even, vertical rays at the Equator do much less harm in this respect.

When there is not enough labour to clean the whole ground, circles are weeded and dug round the trees. This is a good system with young trees that have not yet extended their roots very far, but large trees do not feed directly from the surface soil immediately round their bases, to any great extent, but from that farther away towards the centre of the rows. The surface roots at the base chiefly serve the mechanical purpose

A COCOANUT PLANTATION

To face p. 68.

of supporting the tree and conveying the plant-food collected by the distant feeders.

Hilling up with earth scraped from towards the centre of the row round the base of the tree denudes the surface of soil at the very place where it is most required. When, therefore, there is not sufficient available labour to clean the whole surface, a strip down the middle of the rows should be cultivated in the case of big trees.

Touching this question of available labour it would seem that with some prazos too much is being attempted. There is a natural and a commendable desire to be able to quote large figures, but at the same time it is better to have fifty thousand trees under good cultivation than a hundred thousand neglected. If by good cultivation we can make our trees yield thirty nuts as against fifteen from neglected trees, then for a given quantity of copra produced we have only half the cultivating expenses to meet. Neglected plantations are exposed to fire and to a large mortality among young trees, entailing the expense of replacing.

The chief impression derived from a study of the cocoanut-planting industry of Quelimane is that a lot of land has been put under cocoanuts which is not cocoanut land. Cocoanuts will not grow in swamps, yet hundreds of hectares of

swamp have been planted up with palms. Through these swamps numerous drains are cut to lead the water off, yet the drains often do not work but hold stagnant water. It is quite an exception to find a drain with running water in it, or dry. In many cases the drains are cut without any regard to outlet or a proper fall. There are plantations or parts of plantations crossed and recrossed with ditches from which the water could not possibly escape, as there is high ground all round which has not been cut through. On other places a proper system of drainage with an adequate fall has been worked out, but the ditches are choked and the water dammed back.

The notion seems to prevail that trenches are all that are necessary, and that provided you have plenty of them the water will all be drawn away from the land. The consequence is that these swamps remain swamps; and cocoanuts are planted in them with the expectation that they will thrive with stagnant water within 2 feet of their roots. Cocoanut-trees send their roots down from 2 to 3 metres below the surface, and if stagnant water exists within that limit they cannot prosper as they should. The effect is most marked upon them; the leaves taking on a yellow tinge as soon as a depression is reached; a sure indication of water. Thousands of trees have been planted out

in these swamps from which no profitable returns can ever be obtained.

Before trying to reclaim a swamp we should make sure that we have sufficient fall to carry off the water and that the expense will not be too great. Then if we dig our drains we must make up our minds to keep them open, otherwise it is better to leave it all alone and plant only on the dry lands.

But there is another most serious evil connected with these drains.

Science has shown the danger to human health and life mosquitoes possess, and all over the tropical and sub-tropical world Governments and private individuals are carrying on a campaign of extermination against them ; yet here we have people deliberately converting their land into mosquito farms. Mosquitoes breed in these drains in millions, rendering the plantations almost unfit for human habitation.

When one considers this side of the question, and the fact that drains are costly to make and keep open, and that the land, even when drained, is not good cocoanut land, however it might suit rice or sugar, we are brought up with the query : Is it worth while planting up this swampy land with cocoanut-trees ? It is very doubtful.

There is good cocoanut land in the delta of

the Zambezi, between the Chinde River and the main stream.

At Inhambane cocoanut-planting has been carried out on much more modest dimensions than at Quelimane; the whole industry, indeed, is but small in comparison. Very little capital has been expended by Europeans in planting cocoanuts, nearly all the trees now bearing having been planted by natives. Pursuing the same system as when estimating the number of trees in Quelimane, viz., calculating from the export of copra, the number of cocoanut-trees that have reached the bearing age in the Inhambane district works out at 194,604. This is against 1,621,808 in Quelimane. There would, therefore, seem to be nine times as many trees of bearing age in Quelimane as in the Inhambane district. I have allowed for an average yield of twenty nuts per tree against fifteen in Quelimane because I think there is a smaller proportion of unproductive trees. No doubt Quelimane, where the soil is favourable, is a better cocoanut country, the trees yielding heavier crops than at Inhambane, but, as I have pointed out, the land there is chess-boarded with swamps, a fact which pulls the average down. Again, at Quelimane there are a large number of trees just come into bearing but which have

not yet arrived at maturity, and this would further tend to reduce the mean output. On the other hand, at Inhambane probably a larger proportion of nuts is consumed by the people, as in the coastal belt, where the cocoanuts grow, there are much fewer trees per head of population. Counting these in, the average yield would probably amount to thirty nuts per tree. If we add 75,000 young trees, the total of cocoanut-trees in Inhambane is brought to 270,000.

In the interest of those who may contemplate embarking capital in cocoanut-planting at Inhambane or elsewhere on the coast, it is advisable to state again that when estimating the performance of a plantation or the suitability of a locality for growing cocoanuts we must base our returns not only upon the trees from which nuts are actually gathered, but upon all the trees on the land of a bearing age, whether any nuts are cropped from them or not. If he is not careful about this, the inquirer is apt to be totally misled. Quite recently I asked the owner of a cocoanut plantation, not at Inhambane or Quelimane, what his yield per tree per annum was. He told me 150 nuts per tree, adding that there was one tree which gave 400. I happened to see the returns of a plantation not far away from that place where the average yield worked

out at seven nuts per tree. On one occasion I watched three trees close together while 450 nuts were gathered from them, and from which four gatherings were obtained per annum. Pursuing the fashion of enthusiasts, I might have concluded from this that the plantation gave a mean output of 600 nuts per tree per annum had I not known from the records extending over several years that the average was actually only eighteen. Appearances, again, are often very misleading, because in unsuitable localities trees often shed their nuts before they are ripe, not having the strength to bring them to maturity. It by no means follows that trees that carry heavy spikes are going to give heavy crops. The ground should be carefully examined for fallen unripe nuts.

Cocoanuts can be grown much more cheaply at Inhambane than at Quelimane, the land being much less expensive to work; and provided the trees are cultivated and that the owner lives on the plantation himself, or places a vigilant and reliable man in charge, cocoanut-growing will undoubtedly pay in Inhambane on selected areas near the coast. It would be quite useless to attempt them beyond a limit of 8 or 10 kilometres from the sea. Predial larceny is an evil that is worse than any insect pest, and can never be completely put down. Every cocoanut planter should make up

his mind to that and allow for it. His own presence on the plantation will provide a better check than any other on native thieves, and hence a *bona-fide* planter who lives on his estate should not suffer serious loss from stolen nuts. The absentee need not expect a moiety. One owner informed me that some years ago he lived on his estate and obtained 100,000 nuts per annum from 3,000 trees. Now he had 4,500 trees, but as he no longer lived there he obtains only 20,000 nuts per annum. Thieves had reduced his average yield from 33 nuts per tree to less than 4½.

The most economical treatment of land carrying young cocoanut-trees is to weed lanes 6 to 7 feet wide along the rows, widening the space at each tree to a circle of 6 feet in diameter to render it secure from fire. Each year, as the trees grow, the weeded portion is extended, till finally, when the fronds have nearly met, the whole ground is cleared. Catch crops may then be introduced.

A few cocoanuts fringe the bay at Mozambique, and shelter the villages of Angoche, but as I have already stated the district is not suited for cocoanut-planting on a commercial scale save in certain favoured spots. Lourenzo Marques is, of course, too far south. Adding these districts to those of Quelimane and Mahambane, the total number of trees in the Province (not including the two Com-

panies' territories) may be put at three million. From the foregoing study of the industry as it exists it may be concluded that the Province within the territorial limits referred to is not a first-class cocoanut country; a conclusion, I think, justified.

CHAPTER IX

CEARA RUBBER

One of the most serious problems occupying the minds of those interested in the agricultural development of the Province of Mozambique is the future of rubber-planting. The case would perhaps be better put by the query : Has rubber-planting a future in the Province or has it not? There exist in the districts of Lourenzo Marques and Inhambane several small plantations of Ceara rubber, some of them planted by the Government at the Circumscriptions and some owned by private individuals. They consist of trees that have reached the producing stage, but in no case are they being successfully worked. Hence the reputation of the Province as a rubber country has not yet been established. On the contrary, it has been damaged ; and incidentally it may be mentioned that if it is true, as it certainly is, that one successful man will do more to encourage the development of an industry than any number

of Government experiments and reports, it is equally certain that a pioneer who fails injures the cause.

It is fondly believed by many people that you only have to plant your trees, and that thereafter, when the trees have arrived at the producing age, the business of extracting rubber from them is as simple as tapping beer from a barrel. There recently appeared in a London journal (the *India-rubber World*) a copy of the instructions that a private owner of rubber plantations in the Federated Malay States issued to his managers and assistants. He was the largest private owner in that country, the greatest rubber-planting country in the world, and his instructions occupied ten columns of the journal. Something of their nature may be gathered from the two following paragraphs, which served him as texts :—

"The first, last, and only reason for managers, assistants, and coolies being employed on the estates is the production of latex. The one aim and object of all the expenditure of money and labour is the production of the greatest quantity of rubber of the best kind at the lowest possible cost.

"The arguments put forward above for the utmost well-being of each individual rubber-tree apply with still greater force to each individual

coolie on the estate. No expense or trouble is too great that will ensure a well-housed, healthy, and contented labour force."

The foregoing is intended as a warning against supposing that while the view is expressed that there is a good outlook for rubber-planting in Quelimane, it cannot all be left entirely to the land. The planter must do his part, and to do that successfully he must either set about acquiring practical experience in the management of a Ceara rubber plantation, or engage the services of an experienced manager. The business cannot be learned by reading about it. Perhaps the greatest service a writer can do in the cause of rubber is plentifully to sprinkle his pages with danger-signals, and to urge that in the case of such a new industry as this the planter, before he begins, should make as sure as he can what he is going to do, how he is going to do it, and how much it is going to cost.

Owing principally to the investigations of Captain Cardozo, Inhambane has been the chief centre of experiment with Ceara rubber (*Manihot Glaziovii*) in the southern part of the Province. An examination of his results has confirmed me in the opinion I have long held, viz., that very little is as yet known about the cultivation of this tree, and that its behaviour in one place

may be quite different from what it is in another a few hundred miles away. As we are but at the dawn of rubber cultivation, there is a danger of the Government and the public being misled by people who pose as "rubber experts"; but the truth is it is necessary to approach the question of the cultivation of Ceara rubber in the Province of Mozambique from the point of view of learners, deriving what profit is possible from the experience of other countries, but prepared to find that all sorts of peculiarities are likely to manifest themselves with a change of soil and climate.

It has been said of the Ceara rubber-tree in German East Africa that you cannot kill it, but on the poorer soils of Inhambane the trees after eight or ten years begin to die back from the top. They should be planted only on the red or grey soils, not on the low *mashonga* or the white sandy soils. Even on the red soils a good stand of young trees cannot be relied upon. Captain Cardozo drills his seeds in like maize, in rows 4 metres apart, and then weeds out, his experience being that 90 per cent. of trees planted turn out to be weak, and never grow to any size. He prefers trees with the old leaf nodes or rings close together, the latex being always richer from them.

Captain Cardozo's method of tapping is a compromise between the conduit system, whereby the latex is first collected and afterwards coagulated, and the stabbing system, with which the rubber is coagulated on the trees. He extracts the rubber by stabbing, but collects the latex in the liquid form and allows it to coagulate afterwards in water, no coagulating reagent being used. After coagulation the rubber is rolled out in the form of flat, round biscuits. It is beautiful clear, tough rubber with good nerve. In 1906 he conducted some careful experiments to ascertain the yield of the trees, selecting for the purpose four six-year-old trees, which he tapped for 92 days, from January 7th to June 20th. The dimensions of the trees were as follows:—

Tree.	Girth. Metres.	Height. Metres.	Surface Tapped. Mean Superficial Area. Sq. Metres.
No. 1	0·64	1·75	1·12
No. 2	0·50	1·80	0·90
No. 3	0·455	1·80	0·81
No. 4	0·55	1·77	0·97

RESULT.—Total dry rubber ... ... 1,161 grammes.
Average per tree (10·15 oz.)... 290 ,,
Average per tree *per diem* ... 2·55 ,,

The second season he continued the experiment with the same four trees, from December 25, 1906,

to July 25, 1907, a longer period, but he tapped on 61 days only.

Result.—Total dry rubber	1,235	grammes.
Average per tree (10·78 oz.)	308	,,
Average per tree *per diem*...	5	,,

The weight of latex extracted jumped from 23 grammes *per diem* the first season to 36 the second, suggestive of a phenomenon corresponding to the "wound response" of Hevea. This has hitherto been denied Ceara, though some planters maintain that Ceara rubber-trees are the better for being lightly tapped when quite young, say at two years old, to train them to the knife, and that trees that are subject to regular tapping swell in girth where the operation has been performed.

I do not think Captain Cardozo's method of tapping suitable for the country. It is true that to obtain biscuit rubber it is necessary to collect the latex in the liquid form and coagulate afterwards; but this method of extraction, involving the arrangement of funnels and cups to prevent the escape of the latex, is one difficult to teach the native of East Africa; Captain Cardozo stated that it required a period of six months to teach a native his system. The system of coagulating on the tree offers less opportunity for the escape of the latex, as it is harnessed to the tree as soon as it

exudes. During my stay on his plantation, Captain Cardozo very kindly permitted me to conduct some tapping experiments. I set to work with nine natives, none of whom had ever tapped a rubber-tree before. We tapped one morning from 7 till 11 a.m., and in the afternoon of the same day from 2.30 till 5.30. During this period 65 tappings were made from some 45 trees, which yielded 357 grammes of wet rubber. Sixty-five tappings may be taken as a day's work for one trained man, though one man will tap anything from 50 to 400 trees according to the time of the year and the system of tapping in vogue at the particular plantation at which he works. A daily task on a plantation is usually 350 grammes of rubber. This experiment, if it is worth anything, indicates a very fair flow of latex, especially as the tapping season was at that time over and that the month, October, was most unfavourable for tapping, half of the trees having no leaves on. The long midday interval was rendered necessary by the fact that the latex would not flow during the hot hours but beaded at the incisions. The trees were four years old. The rubber was of excellent quality, clean and tough. In the afternoon I was compelled to leave the natives to carry on by themselves. From this brief trial, and from the far more exhaustive experiments of Captain Cardozo, and

also from my examination of the trees of the district, I am of the opinion that landowners in Inhambane might safely plant Ceara rubber on the grey and red soils, though not on the white sandy soils. To any one wishing to plant rubber in the Province of Mozambique I should not say go to Inhambane; but to a planter in Inhambane with suitable soil available I should have no hesitation in advising a trial plantation of Ceara.

At a distance of about 70 miles from the coast, at an elevation of perhaps 1,500 feet about sea-level, and right in the heart of the zone which I have described as the rubber zone of Quelimane, there is a plantation of between 400,000 and 500,000 Ceara rubber-trees; 90,000 of which were, in 1911, between $3\frac{1}{2}$ and 4 years old, 30,000 1 to 2 years old, and 150,000 6 months old.

The trees were put out in rows 4 metres apart, 3 metres separating the trees in the rows, spacing that seemed to suit the country well enough, though 10 by 10 feet is the spacing now most generally adopted in German East Africa. At first the seed was sown in nurseries and the trees planted out afterwards, but there is no necessity for this expense and trouble in the case of Ceara, which can very well be planted at stake, that is, *in situ*, two or perhaps three seeds being sown at each stake. I detected the same mistake here as in some of the

Phot. *Car.* *Belém*

A CEARA RUBBER PLANTATION, RIVER BUZI

cocoanut plantations at the coast, namely, that more planting was being done than could be attended to properly afterwards. I know of no plant that responds to the hoe more quickly than Ceara rubber, though on the other hand there is none that suffers more if neglected. In this case thousands of trees were left in a jungle of long grass in imminent danger of fire; the labour which should have been devoted to them being applied to the preparation of new ground for fresh planting.

No tapping was in progress, the reason being, I think, that no one connected with the place understood how to tap or properly to manage a rubber plantation. Ceara rubber-trees may be tapped when at a height of 1 metre from the ground they are 9 inches in girth. In a plantation where the trees are properly and systematically tapped the yield should be at the rate of three to five trees to 1 lb. of rubber per annum. Allowing, the trees being young, that the yield would be 1 kilo from 15 trees (56 kilos per hectare), and estimating the price at 6s. 6d. per kilo and the working expenses at 3s. 6d. per kilo, these 90,000 trees should have been returning a net profit at the rate of £900 per annum.

Some tapping experiments had been conducted, 28 kilos (61½ lb.) having been obtained from

fifty four-year-old trees tapped on six successive days by twelve men. This was probably wet rubber, so 40 to 50 per cent. may be deducted for drying; a further deduction has to be made for impurities such as bark, which it was admitted was present; but the results are still remarkably good.

I tapped some thirty trees, and the flow of latex from them being such as to promise that under proper management the trees should yield handsomely.

The deadlock which the management of this plantation had apparently reached, and the rich returns that might have been and still may be obtained each year as more trees come into bearing, is an example of the importance of securing skilled management, and the folly of thinking that any one who can speak the native language can manage a rubber estate.

The principle of stabbing or pricking is now generally accepted as the most successful system for the East Coast of Africa, but it is important that this system should be applied in the right manner. The stabs should be made with the flat of the knife held horizontally, not vertically, as was being done in this case, and they should be made close together. The trunk of the tree may be divided for the purposes of tapping into

two or three parts, vertically, each part being subdivided laterally into three or four sections according to the girth of the tree. This will provide for from six to twelve tappings, one section being taken at a time. Tappings may follow one another for three or four days, and then an interval of a fortnight or twenty days allowed to intervene. This may continue for as long as the tree is in leaf, which may be, perhaps, nine months out of twelve. A 3-per-cent. solution of acetic acid brushed on the trunk of the tree before tapping may be used as a coagulating mixture, but carbolic acid, which makes the rubber harder, is now being used in German East Africa, either by itself or mixed with acetic acid. As is well known, the juice of citrus fruit and a solution produced by boiling the pulp surrounding the seeds of the baobab tree are also efficacious as a coagulant, especially if carbolic acid be added. The strength of the mixture must be regulated according to the weather; a more concentrated solution being required when the weather is wet and the latex watery; and the manner of applying it to the tree must be carefully observed; the surface below the section to be operated on being well dressed to prevent the latex running through to the ground and getting mixed with sand.

Coagulation may take place almost at once, or after some hours. Calcium chloride is now coming into use as a coagulant, mixed in the proportion of 100 grammes to 1 litre of water, each man being given 8 litres of the mixture daily. The best method of collecting the rubber is by rolling it on a stick or small roller. In this way both hands can be used and the rubber pulled away from the trunk to avoid any bark getting in. The method of treatment afterwards varies. In some cases the rubber is sliced and soaked in water for a few hours to get the smell of the acid out, and then laid out on tressellated shelves in the shade to harden. In others it is put through a washing-machine and rolled into sheets.

The process adopted will depend upon experience, it being always remembered that clean tough rubber is what the manufacturers require; and that while washing or a special treatment may procure a slight increase in price, it may be at the expense of more than a corresponding increase in the labour bill.

Peeling off the outer bark before tapping is sometimes practised. In old trees the bark is tough and difficult to pierce with a knife, and the dry scales are apt to get into the rubber. It takes three times as long to bark a tree as to tap it, and though a tree is barked only once

a year, yet on a large plantation a considerably increased number of labourers is required if the system of barking is adopted. No more rubber is obtained, but it is extracted more easily and perhaps in a cleaner condition. On the other hand, the barking injures the tree a little.

Owners of rubber estates in the Province should either obtain the services of experienced managers from German East Africa or send members of their staff there to study for three months the routine of management. The conditions of Quelimane will not be altogether those of Tanga; these will manifest themselves with experience, but the main lines of management can be followed.

A plantation of Ceara should be protected at intervals of 300 or 400 yards with wind brakes * to protect these brittle trees from the effect of the south and east winds.

Ceara rubber grows well in the district of Mozambique, but the rainfall is too small for it to become a payable product there. The long dry season reduces the period during which the trees can be profitably tapped to six months or less, a period not long enough for the revenue to be got out of them. The same limitation applies though to a less extent to Inhambane, and I suspect to the territory of the Mozambique

* See page 114 (Tobacco).

Company also. The rubber is in the trees, but it beads out and will not flow. In such countries a totally different system might be tried with the cultivation of Ceara: a system based on the cutting down of the whole tree except the lower part of the trunk, stripping the bark and passing it through rubber-extracting machines. This system might be worth a trial even in countries like Quelimane, where the rainfall is probably sufficient for ordinary tapping operations to be conducted for nine months in the year. Under such a system trees should be planted about a yard apart and allowed to grow into a thicket. They coppice well, and a crop of cuttings could be expected every year or two years, according to climate and season. No doubt many difficulties and disappointments would be encountered under a new system, and extensive operations would not be undertaken till trials on a small scale had first been made, but no tree seems better adapted than the Ceara to new changes such as the invention of rubber-extracting machinery seems likely to effect.

Manihot dichotoma has been planted in Quelimane, but these trees are small, the latex sluggish, and their appearance did not suggest that they possessed anything like the value for the countries as Glaziovii.*

* See appendix for notes on Ceara rubber.

CHAPTER X

LANDOLPHIA RUBBER FORESTS

The bulk of the rubber exported from the district of Mozambique is derived from the root of a degraded type of Landolphia, probably *L. Kirkii*. The creeping stems are very slender, the rainfall of the country being insufficient for the growth of large and lofty creepers. The forest itself is low and stunted, sometimes being little better than scrub; the soil is sandy and dry.

The principal forests are situated near the coast, one of the most important being that now known as Matadane, in the Capitania-mor de Angoche, enclosed by the Rivers Laridi and Moma, and extending for a distance of some 50 kilometres in length and 6 to 10 in width. North-west of Parapat (Antonio Ennes) is the Marrigi forest in the Capitania-mor de Mossuril. Other forests exist near Mogincual. The total area of rubber forest land in the district is probably considerably over a quarter of a million hectares.

The rubber is found between the bark and the wood of the root, adhering to both, though more firmly to the bark. When the bark is stripped from the wood the rubber is removed with it. The rubber does not exist in the form of latex as in the stem of the plant, but in the solid condition, that is, as rubber already coagulated. For this reason it cannot be tapped, because it would not flow, and can only be extracted by digging up the roots, barking them, and finally separating the rubber from the bark.

This difference between the secretion of the stem rubber and root rubber has an important bearing on the value to the country of the two classes of forest, the one requiring different methods of management from the other.

For the purpose of separating the rubber the native first provides himself with a flat stone and a wooden hammer fashioned out of the fork of a tree. With this he lightly taps the roots, loosening the bark. He then pulls the bark off the stick like a glove from a finger, the rubber adhering to the bark. When he has accumulated sufficient bark, about as much as he can hold in his two hands, he proceeds to beat it with the wooden hammer, turning the mass over and watering it from time to time. This pulverizes the bark, and when the whole

mass has been reduced to pulp he puts it in water, which he heats over a fire to a boil. He then takes it out, squeezes it, treads on it, and heats it again till he has got rid of as much more bark as he can, when he tears the sheet of rubber into small pieces, squeezing each piece into a ball. For very clean rubber two boilings are necessary, but some is not boiled at all, the crude pulp after a little beating and washing being at once rolled up into balls.

The quality of the rubber so prepared varies according to the amount of washing it has received, the lowest quality, which is more than half bark, being valued at Hamburg at 2s. a kilo, and the best at 4s. 6d. a kilo (November, 1911), but the best has a large percentage of impurities in it and would rank as a very low-grade article in the European market. The trade is in the hands of Indians, who buy it from the natives and ship it on consignment to Hamburg through European houses. They make no effort to induce the native to bring in cleaner stuff, and are themselves quite indifferent to the argument that they incur expenses in paying freight on bark which is of no value. Sometimes the rubber is brought in quite wet, and in this condition it is stored by the Indians and shipped. By the time it arrives it is "tacky"

and greatly depreciated in value. It will be seen that this rubber trade in Mozambique is in about as bad a state as it well can be. Fairly clean stem rubber was valued at the same time at 7s. 9d. a kilo.

The Matadane forest is, I think, the only rubber forest on the East Coast of Africa under systematic management. Several rubber concessions have been granted or are projected in the Province, and in Natal an attempt at working a forest of 200,000 acres will shortly be made, but the Matadane concessioner has begun operations, and I regard this enterprise, the first of its kind, as of special interest not only in the Province but on the whole coast. It is breaking fresh ground, and the success or failure of Matadane may mean a great deal to the country. Success will encourage others: failure may frighten them away.

From the Government point of view there is a great difference between the exploitation of a root rubber forest and that of an ordinary Landolphia forest where the latex is extracted from the stems. The belief is crystallizing that the only way to work a forest profitably is to cut down the vines and strip the bark from them, and I shall return to the consideration of this question; but whatever doubts may exist as

to the best system to adopt in working stem rubber, there can be none about working root rubber. Roots being underground cannot be tapped, and even if tapping them were a practical proposition, the rubber being solid would not flow. The roots must, therefore, be dug up or the rubber left alone.

This clears the ground and leaves us free to consider how best to obtain the rubber from the roots after they have been dug up. I have described the native process; it is long and laborious, and judging from what I saw two men could not obtain in one day more than about half a pound of rubber valued at 50 or 60 per cent. of clean stem rubber. This offers little inducement to the native, so a concessioner would seriously be faced with that most troublesome of African problems—the labour question. His object being to get rubber he would have difficulty, owing to the small remuneration he could offer, in inducing a sufficient number of natives to devote themselves constantly to getting it for him. Employing a considerable amount of capital, he must not only get rubber but get it in quantity.

The only solution of the difficulty is to extract the rubber by means of machinery, and I am convinced that without machinery root rubber

forests cannot profitably be worked. Digging up the roots must of course always be performed by hand labour, and it would not relieve the native to remove the bark from the stem by machinery, as he would then have the extra weight of wood to carry to the factory. A machine is required to churn up the bark into a pulp and separate the rubber by the application of hot water or steam.

At Hore, Matadane, I made an experiment, of which the following are the particulars, to determine the proportion of rubber obtained from roots :—

	Lb.
Weight of roots gathered in the morning (October 8, 1911) and brought in before 8 a.m.	17
Weight of pulped sheet resulting therefrom, *i.e.*, bark and rubber less wood	5·5
Weight of wet rubber after preparation, fairly clean, valued at 500 reis per kilo, highest price locally ...	0·5
Wet rubber from roots	3 per cent.
Wet rubber from bark pulp	11 per cent.

A concessioner who paid at the forest 500 reis (2s.) a kilo for fairly clean wet rubber could, according to this experiment, afford to purchase the bark pulp at 55 reis a kilo, or, to allow for the expense of subsequent preparation by machinery, say, 50 reis (2½d.). The current price at the time of clean, tough Landolphia (stem) rubber in the

London market was about 3s. 9d. per lb. (8s. 3d. per kilo).

This, of course, is only one experiment, and many such would be required with old and young roots in dry and wet weather and on different soils to obtain a mean working percentage.

The question next arises: Does a root rubber forest renovate itself, or is the process one of gradual extermination? I am supposing that the native does not dig up *all* the roots of a plant; if he does, then that plant is destroyed, and there is an end of the matter as far as it is concerned. Certainly a few must get totally uprooted in this way, and therefore if no steps are taken to replace such deaths some decrease in output will eventually take place.

But in the majority of cases a few roots are left from which shoots appear, and as growth above-ground is always accompanied by growth below, then new roots will also develop. But in a dry district like Mozambique the growth must be very slow, and when once a forest has been worked through I am inclined to think that as a source of rubber it would no longer be a paying proposition. The question of replanting I am dealing with under stem rubber.

The total amount of rubber existing in the roots of a forest can never be extracted, because the

natives do not follow the roots down to their extremities, but chops them off when he has dug down about 1 foot, or at most 2 feet. To go farther down he must dig himself a large hole in which to work with his hoe, and this it would not pay him to do; and as Landolphia, even the degraded type of Mozambique, sends its roots down 5 or 6 feet or more, it is manifest that only about one-third of the total quantity of rubber existing in a forest can ever be collected, the use of machinery for this operation being impracticable. The native would be able to work much more rapidly and effectively if provided with a light mattock instead of his hoe, which is not suited for chopping through roots. A tangle of roots other than those of Landolphia has often to be severed before a hole can be made.

The forests are in places impenetrable, so the natives do not go far from the paths for their roots; it becomes a necessity, therefore, to cut tracks through the forest to lead them to exploit new regions, the tracks being laid out on a plan to divide up the forest into blocks, so that it may be easily controlled. Shortness of labour is the experience of nearly all big enterprises in East Africa, and the efforts of the management should be directed to making things as easy as possible for the native, especially in rubber-collecting, a

task he is not very fond of. And in this connection it is important to remember that while we cannot compel him to work, we can easily frighten him away.

The rubber forests of Mozambique have been for many years tapped by natives who sell their rubber to Indian traders. The very fact of a European entering into possession of a forest is likely to check the traffic with Indians; but unless the owner is content to put up with a continual, if small, leakage, it will be necessary for him to adopt definite measures to protect his property.

Robbery of the rubber can be countered in four ways. The first is by the introduction of labour-saving machines for the extraction of the rubber from the bark, such as I have described, erecting them at intervals through the forest. This would provide an attraction to the native by saving him labour and travel. But it would not in itself be sufficient, because the Indian will buy any filth, even crude bark and rubber, provided it can be rolled into a ball; and again, travelling for the natives is often but a pleasant pastime, especially if he has an excuse to go into the town or to the store.

The second weapon in the hands of the European is a patrol of native police. But unless carefully watched native police are likely to do as

much harm as good in tyrannizing over the people, and thus driving them away. Nevertheless, it is certain that unless some system of police control is established robbery will go on.

The third measure is to outbid the Banyan, though this could easily lead to unprofitable warfare.

The Banyan's power lies in the fact that he is a trader and can offer the rubber collector the twofold advantage of buying his product and selling him goods that he requires. In order successfully to compete with the Banyan it would be necessary for the concessioner to adopt a fourth preventive measure, and to lay in stocks of goods at convenient centres with which to barter for the rubber; or, to go a step farther, to open small stores to enable the collectors to purchase their clothes, tobacco, salt, rice, and other necessaries. A store possesses a great attraction for the African, and no organization for the collecting of rubber from a large forest based on the purchase system could be considered complete without one or more stores.

In the foregoing brief sketch of the lines to follow in the administration of a large rubber forest I have left out of account altogether the idea of collecting rubber by labourers paid fixed wages per week or month, as unless each labourer

were required to bring in a certain amount of rubber a day I think such a system would not be profitable. One can supervise a large number of labourers in a plantation, but not in a forest.

Much of what I have said in the foregoing with regard to the management of root rubber forests will apply also to the management of Landolphia forests of Inhambane and Lourenzo Marques, in which the rubber is derived from the stem. Especially is this the case with regard to the cutting of roads, police patrol, trading, and attracting native labour. There is one fundamental difference, however. In the case of root rubber the roots must be dug up as we have seen whether the forest is ultimately destroyed or not; but in the case of stem rubber, latex can be tapped from the living vine. I desire here to examine the arguments for and against cutting down the vines in order to extract the rubber from them by machinery.

The principle is very much the same as in root rubber. The vines are cut down, divided into lengths, the bark peeled off and put through a pulping and separating machine. With most machines the bark has first to be peeled off by hand, adding thereby very much to the expense, but efforts are now being made to produce a

machine to do the barking. In the case of the root a few taps with a hammer are sufficient to loosen the bark, which can then be slipped off the wood, but bark from the stem has generally to be stripped off with a knife.

I have been in communication with several foresters and rubber concessioners on the subject of the time required for the vines to grow again to a tappable size—say 3 inches in circumference —and opinions vary from six to twenty years, but no practical trials on a forest scale have as yet been made in East Africa, and hence these opinions, though given by men who have devoted special attention to Landolphia rubber forests, have but a restricted value.

Taking the period for the sake of discussion at fifteen years, in the somewhat dry climate of Portuguese East Africa, I should like to put the question: Is there any economic product known to tropical agriculture that pays to cultivate if fifteen years are required before returns can be obtained? The capital expenditure would be prohibitive; no product that I have ever heard of could stand such a locking up of capital. But it may be argued that cultivation of the vine is not contemplated, the idea being to let Nature herself restore the vines. Nature would no doubt induce the growth of

new shoots from the stumps of cut vines to some extent. Mr. Dawe, the Director of Agriculture of the Mozambique Company, found that on the Madanda forest the general average of the number of vines 6 centimetres and over in circumference per hectare in the rubber-bearing area worked out at eighty. The average number of vines required to produce 1 kilo of rubber is not known, I think, but there are data upon which an estimate can be made of the return per hectare. For instance, in the experiment I made at Matadane, described above, the weight of wet rubber was 3 per cent. of that of the wet roots; we may assume, therefore, that 100 kilos of dry roots would yield 3 kilos of dry rubber. Vines, of course, vary enormously in size. Mr. Dawe noted one varying in circumference from 18 to 62 centimetres, which carried approximately 150 metres of tappable branches, but for this rather dry part of Africa the average would be much less than this. One metre of dry Landolphia rubber stem 9 centimetres in circumference weighs 417 grammes. Taking the average circumference of tappable vines at a little larger than this, we may reckon a piece of dry stem 2 metres in length weighs 1 kilo, and that an average plant carries 20 metres of tappable branches.

From these data we can make the following computation :—

2 metres of dry stem weigh...	1 kilo
1 plant (20 metres) will weigh (dry) ...	10 kilos
80 plants (1 hectare) ,, ,, ...	800 ,,
800 kilos of wood will yield 3 per cent. rubber	24 ,,
24 ,, of rubber at 8s. per kilo	192 shillings
1 hectare of Landolphia forest will yield 24 kilos of dry rubber valued at	£9 12s.

Compare this with the return from a plantation of Ceara rubber :—

1 hectare planted 12 feet by 12 feet contains...	745 trees
745 trees at 10 trees per kilo of rubber gives ...	74 kilos
74 kilos of rubber at 8s. per kilo	592 ,,
1 hectare of *Manihot Galziovii* will yield 74 kilos of rubber valued at	£29 12s.

In the one case you have to wait fifteen years for a gross return of £9 12s., in the other one year for a gross return of £29 12s.

The probability, nay certainty, is that fifteen years would find a material reduction in the number of vines per hectare, because Landolphia requires a certain amount of light and will not thrive in dense forest, but the tendency of a closed forest would be to become dense and dark. If the forest is to be planted up with new vines, then the young plants must be looked

after or the bulk of them will certainly perish, but it would be impossible to superintend properly the work of looking after young vines planted in an impenetrable forest with pathways only at intervals. Indeed, the only practical way to cultivate Landolphia would be, I think, to plant it in rows on live supports, like vanilla, and regulate the top shade according to experience.

The more we examine this question of the management of Landolphia forests in the Province, the more we seem to be forced to the conclusion that, having once gone through a forest and chopped up the stems for the purpose of mechanically extracting the rubber with a machine, that forest is finished with as a rubber-producing area.

My own belief indeed is that chopping down the vines—and I would even go farther and root them up afterwards in order to get as much rubber out as possible—for mechanical extraction is the only way a forest can be profitably worked. The native method of scarfing is destructive and wasteful as it weakens the vines, in many cases destroying them, while only a fraction of the rubber is extracted.

These forest-clad lands have no doubt had their forests destroyed by fire or by natives for

garden clearings, hundreds of times during past ages, and this points to the probability of the vines having grown up with new trees, a probability that is confirmed by the well-known dislike of Landolphia for dense shade. When we seek to restore Nature's work we should follow her methods, and if this supposition be true these methods would, I think, find few supporters among practical men. The alternative would appear to be to abandon any idea of attempting what Nature herself did not attempt.

There are probably a million hectares of Landolphia forests in the Province, carrying rubber of the value, at £10 per hectare, of £10,000,000.

CHAPTER XI

FIBRE

Sisal hemp is being grown in several parts of the Province, notably in Quelimane, where there are close upon three million plants in cultivation. The spacing adopted is 2 by 1·75 metres, but that most favoured in German East Africa, the home of sisal-planting on the coast, is 2·30 by 1·50, it being found that plants do not, as a matter of fact, injure one another at this distance (1·50), though the leaves overlap. In German East Africa suckers are preferred to bulbils as they save a year, but in Quelimane there are not yet enough suckers available. Three and a half per cent. of fibre is stated to have been obtained at Malinguine in 1910; 3 per cent. in 1911; the difference being accounted for perhaps by the unusually heavy rains of 1911.

When cutting in the plantation plants are denuded of their leaves with the exception of a few vertical ones in the centre which have not

begun to expand. This wholesale stripping must effect the output of the factory in the direction of a general lowering of the quality of the fibre as well as the percentage, as the new leaves are still very succulent and immature. Nothing is really gained by being too greedy about leaves, as what is left from one cutting will come in for the next. A plant giving twenty-five leaves per cutting, those below an angle of 45 degrees being left, at intervals of six or eight months and poling at seven years will give about 210 leaves in a lifetime, the first cutting taking place at three years. We don't increase the total number of leaves a plant will yield by cutting too many away at one time, though in lowering the vitality of the plant we reduce the length of subsequent growths and hence the total weight of fibre produced.

In German East Africa, on some plantations 100 kilos of stems give 1½ kilo of fibre; 1 hectare producing 6 to 8 tons of leaves; on others, 66 tons of leaves produce 2 tons of fibre. On one plantation 200 tons of fibre per annum was obtained from 400,000 plants. Each hectare, it is estimated, should give 7 tons of fibre before plants pole; the cost of fibre at the mill being between 130 and 150 marks.

The suitability of the district of Quelimane

NURSERIES OF SISAL HEMP, QUELIMANE.

Mature plants in background.

for the production of sisal hemp was demonstrated by a remarkable report on a sample from Malinguine sent to Messrs. Gray, Dawes & Co., of Great Winchester Street, London, in 1911, for the opinion of their brokers. It stated that "This is the finest specimen of sisal hemp for length and strength and colour we have ever seen." On the red soils of Inhambane I saw equally good plants; in one plantation of 70,000 the four-year-old plants were 7 feet high. The district of Lourenzo Marques, taking it through, is, I think, outside the sisal belt, but there are certain parts on river-banks where it is growing well.

One fundamental condition for the success of a fibre plantation is a river or a lake, though preferably a river, and in a country that abounds with rivers there need be no difficulty about that. I visited one factory where there was no stream or lagoon. Water for the boiler and tanks was being carried on the heads of women from a small stream that flowed through another man's land some distance below, and the pulp instead of being washed away by running water as it fell from the decorticators was being removed in buckets.

Mauritius hemp (*Fourcroya gigantea*) is being

worked at Inhambane with very good results as far as quality goes. A report from the same source on a sample from the red sandy soils stated: "In to-day's bad light we cannot be sure if the colour is as white as what we should call superfine, but the length, cleaning, and strength are in every way quite satisfactory."

Fourcroya produces leaves of uneven length. A 4-foot leaf will often be followed by one twice the length, requiring very much more resistance to prevent it from being drawn bodily through by the rapidly revolving decorticators. A feeder cannot, therefore, time himself to exert a pull of constant force and proceed with his feeding automatically as in the case of sisal, where the leaves are generally of a uniform length. The consequence is that on receiving a big leaf, and being afraid of losing his hold, he is apt to thrust it only one-third of the way into the drum before reversing it. The result is that he recovers eventually a length of only about 2 feet of fibre. An examination of the pulp under these conditions discloses the fact that quite a large percentage of the fibre is being lost. Considerable relief is afforded the feeders if these large leaves are split into two or three pieces, according to the thickness, beforehand.

Fourcroya has not proved itself a popular fibre among planters, and in most cases where it has been tried it has eventually been discarded in favour of sisal. To make it pay where others have failed a planter should lay his plans very carefully, so as to reduce expenditure to a minimum, and take every advantage of labour-saving appliances and devices known to practice.

Unlike sisal, which only needs soaking for a short time in a tank of running water, fourcroya requires rather an elaborate dressing before it becomes sufficiently bleached.

On leaving the grattes the green fibre is placed on racks in the shade till the evening; it is then put into a tank with hot water and soap and left to soak till morning, when it is washed in two or three clean cold waters and hung out to dry. All that day and night it is left to dry and bleach on the lines, and in the morning brought in and put through the brushes.

Hand-feeding machines are now being superseded by automatic feeders. These machines receive the leaves, decorticate one-half, reverse and decorticate the other half, and deliver the fibre clean with a much smaller percentage of loss than is the case with the hand-fed grattes or raspadors. Automatic feeders of this character are as yet manufactured by only one firm, I

believe, and are in consequence rather expensive, but the economy in labour and the saving in fibre are important arguments in favour of adopting them.

Ramie or rhea fibre has, in my belief, no future in the Province. It has been the subject of trial in various parts of the East Coast of Africa, but has never yet been made to pay. In order to make it ratoon well it requires irrigation and a forcing cultivation more adapted for small peasant industry than for the employer of labour. A check in the growth of the stems injures the quality of the fibre. Moreover, rapid growth is considered important, the fibre from young stems being finer and more valuable than that from old. I think I am right in saying that no plantation of ramie or rhea fibre has ever yet been profitably cultivated in India, though many experiments have been made. No machine has yet been invented that the planter can use for degumming the ribbons, the ramie of commerce being all produced by Chinese and Indian peasants, who prepare the fibre by hand.

CHAPTER XII

TOBACCO AND COTTON

The most profitable planting industry in East Africa at the present moment is probably that of tobacco-planting in Nyassaland, and it is quite safe to assert that what is being achieved in Nyassaland could also be done in Portuguese East Africa. Tobacco is already being grown at Inharrime in the district of Inhambane, at Tete in Quelimane, but it is air-cured, and until flue-curing is introduced the country will not be able to compete in the European markets and the industry will remain a Kaffir industry.

The wide range of soil and climate provides opportunities for growing a large number of varieties; Turkish, American, Sumatra, and Havannah being already cultivated. Raglan Conqueror is one of the most popular varieties in Nyassaland, and planters in Mozambique would probably be on safe ground to begin with this or some other American type.

Planting begins with the rains, subsequent plantings being made every week or ten days as the rain suits. It should be timed according to latitude, so as not to have the leaves ready for plucking before the dry weather sets in; a period of four months being allowed, a little longer, perhaps, in the southern and less forcing latitudes. The most favoured size for flue houses is 16 or 20 feet square with a 12-inch flue, three or four such houses being sufficient for a plantation of 60 acres. A 20-foot house will carry a charge drying out to from three-quarters to one and a-half ton of leaf in six or seven days; the temperature being gradually raised from 90° to 170° F.

Planters in the Province will do well to take note of a serious difficulty which tobacco-growers in Nyassaland are encountering—namely, the scarcity of timber—and should provide for a sufficiency of fuel, either by preserving native forest or by planting trees. The question is often asked: What sort of trees are best to plant for fuel or for wind-brakes for Ceara rubber? Eucalyptus is the most rapidly growing tree in the country, *E. citriodra* being one of the straightest and best suited for the tropics. *Grevillea robusta*, *Erythrina*, *Melia*, *Pithecolobium*, cashew-nut, and Ceara rubber all grow quickly, and there is

GRADING COTTON, BOMPONA.

a large selection of acacias that might be tried.

Cotton is another product making headway in Nyassaland, of which it is safe to predict a future for Mozambique. Long staple Nyassaland upland, a localized type of American, has proved itself suitable at Bompona on the Chire, and would doubtless do so also in other parts of the Province. The planting season there is February, when the rains are half over, an interval being selected after a rainy day when the soil is damp; the seed is sown in rows 4 feet apart, 1½ foot separating the plants in the row.

The following is the result of 10 hectares planted at Chilomo by the Zambesi Company in 1911:—

	Reis.
Hand-digging the ground	33,520
Planting in lines	20,770
Cultivating	12,600
Picking	54,650
Total 10 hectares	121,540
	= £24 3s.

The yield was 5,500 kilos of seed-cotton, estimated to give 32 per cent. of lint valued at 7d. a lb. with American milling at 5½d., a return of £112.

A West African variety of great reputation

turned out to be quite unsuitable because, being apparently accustomed to ripen its seed in a dry, hot season, it went on growing through the harvest-time and cotton never got an opportunity to form. Egyptian cotton has also proved a failure in Portuguese East Africa, presumably from the same cause. The country requires a variety that ripens in the cool season. Much is heard of Caravonica, but I never came across any one who had made it pay. One objection to this species is that, occupying the ground for two or three years, vermin have time to breed and accumulate. With Nyassaland long staple rooted out and burnt every year the ground is cleaned.

Farther up the coast, within the influence of the monsoon, a sufficiently long, dry season for harvest cannot always be depended upon. This difficulty would also probably prevail in Quelimane, where the rainfall is considerable. In the dry belt of the Mozambique district, on the other hand, which I have described as the region of no running water, the conditions appear to be favourable for cotton, but the country is in such an undeveloped condition that no private planter is likely to settle there for some time to come. Nor will any company or syndicate be attracted thither unless some special inducements are held out. In German East Africa the Government encourage

COTTON FIELD, BOMPONA, 1912.

Last dressing Paris Green for the destruction of boll-worm before the cotton begins to boll

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enterprise by making freehold grants of land according to the area cultivated, and I think some such system might be adopted to encourage a start in the Mozambique district, provided that land occupied and cultivated in extensive areas by natives collected together in large settlements should not be appropriated. With this reservation the Government could offer within this dry belt grants of land up to, say, 10,000 hectares in extent, free of all licences, fees, and charges of any kind, to be held for a period of five years, at the end of that time the land under cultivation, as well as an additional block equal to twice the cultivated area, to become the permanent property of the concessioner free of all charges except cost of surveying. For example, if at the end of five years a concessioner had 1,000 hectares under cultivation, he would be entitled to a freehold grant of land of 3,000 hectares within the block of 10,000 hectares reserved to him. A definite complexion could be given the scheme by proclaiming that a limited number only of such grants would be made—say ten; that the offer would remain open for a period of two years, and that grants would be liable to be cancelled if after the expiration of one year no cultivation had been attempted.

One or two successful ventures would attract

attention to the district, and perhaps induce others to take up cotton-growing or tobacco-planting, another crop which may not unlikely prove suitable to the country. The object of the experiment being to prove that cotton can be grown there, the success of the enterprise would be a matter of considerable concern to the Government and country as well as the concessioners. As far as possible obstacles should be removed from their path, lest a too punctilious insistence upon the observance of regulations might eventuate in the experiment proving that cotton cannot be grown there, which would be a disaster.

OXEN CULTIVATING COTTON, CHIRE

Fifteen sets of two machines each do fifty to sixty acres per day. When cultivating sugar-cane on same principle oxen must be muzzled

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CHAPTER XIII

THREE PRODUCTS OF INHAMBANE

Trichilia emetica, popularly called Mafurreira from the native word *mafurra*, meaning oil or fat of any kind (Swahili, *mafuta*), grows profusely in Inhambane in the populous coast strip. The value of the average annual crop in that district alone cannot be less than £150,000, yet only about £7,000 worth are gathered. The belt extends over the administrative boundary into the region of the lower Limpopo and on to Lourenzo Marques. In this tree the country possesses an enormous source of wealth as yet practically untapped. Forty to fifty kilogrammes of dry seed per tree is not an uncommon yield, and individual trees have been known to produce 90 kilos. They flower in September, seed in December and January, bearing at about eight years old. Mafurreira is a diœcious tree, but the males can be distinguished by their having

larger leaves and a denser foliage than the females, though this characteristic cannot be recognized before the trees are three years old. There are certainly three oil-producing species of Trichilia in Inhambane, perhaps more, the most popular with the natives being known as Makanata.

The seed must be carefully dried as soon as possible after collection, or the oil becomes rancid. It is bought from the natives by the merchants at Inhambane for 30 reis (3d.) a kilo (£6 per ton); its commercial value at the port being £7 10s. to £8 per ton (1912).

The difficulty in the way of exploiting the seed is that of transport; the sandy roads being indeed the curse of the district, constituting a serious obstacle to development. But I see no reason, except the uncertainty of sex, which could probably be got over by planting thickly upon the ground and thinning out afterwards, why the tree should not be profitably cultivated. The trees once established would require no further weeding, as they would soon completely shade the ground, and could no doubt be forced to early maturity. The cultivation of Mafurreira might usefully be made the subject of experiment by the Government.

Telfairia pedata, known locally as jikungo, and farther up the coast as mkweme, is a native of East Africa, and finds a congenial home in Inhambane. In Europe the seeds are sometimes known as Inhambane nuts. It is a dicœcious plant, but it is stated that the seeds producing females are distinguished by a depression on one side and a corresponding bump on the other. The best method of propagation is to sow the seeds in nurseries and transplant when the seedlings are 2 feet high. If planted at stake the seeds are liable to be eaten up by rats. One planter informed me that he planted ten thousand seeds, but only fifty plants came up, the rats having consumed the rest of the seed. The plants are set out at the base of trees, which they climb over and very often kill. They bear in two years, and continue to yield for several years—up to seven or eight—if the soil is good, but in poor soils they will probably die out the third year. Telfairia belongs to the natural order Curcurbitaceæ, and the gourd-like fruits sometimes grow to a length of over 2 feet, and contain over one hundred seeds; perhaps up to forty fruits being born upon each plant.

It has never yet, as far as I am aware, been

systematically cultivated, so no records are available to show the yield per hectare, but its enormously sprawling habit of growth would probably reduce the yield to a low figure, and make the cultivation of this product at the present low price of the seed an enterprise of very doubtful success. The seed is valued at £7 per ton at Inhambane, but as it is one of the richest oil seeds known to commerce, it would probably command a much higher price than this but for the difficulty of decorticating it. The kernel is protected by two shells, the outer one tough and fibrous, the inner one hard and brittle. The outer covering could only be removed by peeling or by burning; the inner one splits with a blow. I do not think that any machine exists for decorticating the nut, though experiments are believed to have been made in Marseilles. A simple decorticator that could be used on the spot, getting rid of the useless husk and shell, upon which freight now has to be paid, might make this product, which at present offers no encouragement to the producer, a valuable source of wealth for Inhambane.

In 1910, Messrs. Lever Brothers, Limited, analysed some seeds of *Telfairia pedata*, with the following results:—

TELFAIRIA PEDATA.

	Husk.	Shell.	Kernels.	Whole Fruit.
	Per cent.	Per cent.	Per cent.	Per cent.
Proportion of ...	8·12	36·25	55·63	—
Oil	0·85	0·30	64·64	—
Moisture	10·85	12·66	4·60	—
Soda, absorption of oil	1·82	1·69	0·05	—
Oleic acid % on oil ...	16·56	15·38	0·48	—
Oil % in whole fruit ...	—	—	—	35·96
Albuminoids % ...	—	—	26·60	14·80

"The seed is enveloped in a closely woven fibrous husk, below that there is a hard and brittle greenish-brown shell, then a thin, silky looking green skin covering the kernel. The husk and shell are not easily separated from the kernel, but a partial separation may be effected by means of a specially designed decorticator.

"We pressed a portion of the whole seed, cold; and a further portion was pressed hot. The residue, after first pressing, was thrown under edge-runners, which broke up the kernels and enabled us to separate the kernels by screening. We got the following yields:—

	Whole seed cold pressed.	Whole seed hot pressed.	Meal separated on screen re-pressed hot.
	Per cent.	Per cent.	
Oil obtained ...	21·85	26·4	Oil from meal 3·2 per cent.
Oil left in husk	3·32	2·6	Oil obtained in original seed 1·6 per cent.
Oil left in shell and kernel ...	10·64	7·65	
	35·81	36·65	

"The cake is almost black and very hard. Unless a complete separation of the kernel can be effected the cake is not likely to be of any value.

"This oil, when refined, will be as suitable for soap-making as olive oil. The cold pressed oil could be used with very satisfactory results without refining."

At Inhambane the Mafurreira-tree is found in thousands, but the cashew-nut in tens of thousands. This tree is a native of South America, but has become naturalized in East Africa, though I have never seen it in such multitudes as at Inhambane, especially at Maxixe and the country beyond. Its presence is always an indication of dry soil. They are sufficiently

thick upon the land to justify the belief that they could be profitably exploited, and if so Inhambane has ready to hand another extensive source of wealth. From all parts of the tree useful economic products are obtained. The timber is used for packing-cases and for boat-building; the bark yields an indelible ink; the fruit a spirit; the shell of the nut an essential oil; the kernel a confectionary.

The unshelled nuts are valued locally at £8 per ton, or £12 per ton f.o.b.; but the cooked kernels are worth in Bombay £24 per ton. Large quantities are sent to that market from Goa. The kernel is enclosed in two shells, between which there is a dark-brown acrid gummy substance with an unpleasant smell when volatilized by roasting. The shells are very hard, but crack easily after being heated. The native method of decorticating is first to roast the nut. This cooks the kernel, volatilizes the gummy secretion, and softens the shells, which are then cracked with a piece of wood. With the unshelled nuts the trade is a poor one, but if a mechanical decorticator could be devised it should prove remunerative.

The distillation of spirit from the fruit of the tree is another means by which the cashew could be exploited, and now that mechanical locomotion

is being increasingly performed by means of internal combustion engines, it becomes a question for the Government to consider whether it cannot adapt its fiscal laws to the altering times, and permit this enormous source of wealth now wasted being utilized for the benefit of the country. The distilled and re-distilled spirit is worth about two shillings per gallon, and a considerable market could no doubt be found for it in South Africa. It is a reasonable estimate that half a gallon of spirit could be obtained from the fruit of one tree, and there being at least five million trees in the district, perhaps ten million, the value of the spirit therefrom would be between a quarter and half a million pounds sterling.

The tree fruits in December and January, and during these two months the natives imbibe freely of the fermented juice of the fruit, nearly the whole population becoming intoxicated. This is a source of inconvenience to the employer, but for the natives themselves it may perhaps be as wholesome as taking the waters is with us in Europe, as the fruit is an anti-scorbutic. Cashew-nut also abounds in the Mozambique district.

CHAPTER XIV

GROUNDNUTS, RICE, WATTLE, *PHORMIUM TENAX*, MAIZE

The East African groundnut, though perhaps not a heavy yielder, is richer in oil than that of America or Madras, but it is not a crop that can be profitably handled by the white employer of labour, it being a very expensive one to harvest and shell. The yield in good loam is from 1,000 to 1,500 lb., unshelled, per acre. Machines exist for lifting the nuts out of the ground, but they are not yet in general use.

Rice is another crop that must, I think, be left to the natives. Indeed, I don't know of any tropical annual food product that pays the European employer of labour to cultivate. Rice is grown by the prazo companies and in the Government reserves of Quelimane, but as the conditions under which labour is employed there do not correspond with those ordinarily encountered by the white settler, the results possess

little value for the planter. Indian seed has been introduced, and it is sown in rows 9 inches apart, one bushel to the acre, the planting season being December. Transplanting to gaps and new fields takes place in wet weather; transplanted always growing better than sown rice. The yield is one to one and a-half ton of paddy per acre.

The only point that can be urged in favour of rice cultivation is that the work of transplanting can proceed in wet weather when other work is held up. Natives who would decline other work in the rain will come and volunteer for rice transplanting, a remarkable example of the influence of instinct.

Black wattle is as yet an untried product, and hopes are entertained that on the Little Lebombos and the low hills that intervene between them and the coast it will prosper. I do not feel very sanguine about it, as this is rather a dry belt of country, the rainfall being possibly not more than 20 inches. I am inclined to think that black wattle would thrive, if anywhere, at Namahacha on the Great Lebombos, where the elevation is greater, the rainfall probably 10 inches higher and the soil richer.

On the alluvial plains of the southern part of

the Province *Phormio tenax*, New Zealand flax, would in all probability grow well. The name flax is a misnomer given to it by the early colonists of New Zealand. It grows through a great range of latitude, but some of the best varieties come from the Bay of Islands at the northern extremity of the north island of New Zealand, between 36° and 37° south latitude. St. Helena, where it has been established, is 16° south. The Lourenzo Marques district, lying across latitude 26° south, comes in between. Phormium thrives in rich soils on the banks of running streams; most of the flax exported from New Zealand is grown on swamps. But the swamps should be drained. In the nursery the seed is drilled in like carrot-seed, and the plants put out in rows 1 foot or 18 inches apart; roadways being left at convenient intervals to allow of the passage of carts or trolly lines. Three to four years are required for the production of leaves fit for milling, after which cuttings may be made annually. The three centre leaves should always be left. Once established Phormium thrives without further care, taking possession of the land and keeping down weeds. Some experiments conducted by the Government of New Zealand in 1908 showed that an average of $8\frac{3}{4}$ tons of green leaf were required to make

one ton of fibre and 4 cwt. of tow. This is over 11 per cent. of fibre; comparing very favourably with sisal.

I have no data showing the yield per acre; in its wild state in New Zealand it is stated to yield from 1 ton to 5 or more.

Care should be exercised in the selection of seed. The following are varieties of Phormium tenax:—

1. *Tehori.*—Whitish butt, very prolific, said to be the best fibre flax found in New Zealand.
2. *Ngaru.*—Long, thickish leaf; soft fibre easily dressed; much prized by the Maori for its fibre.
3. *Awanga.*—White butts thick and fleshy; heavy in green leaf, but poor fibre.
4. *Ngatunui.*—Very red butt and stem; thin drooping leaf; strongest fibre known; has a reddish tinge.
5. *Wharekiki.*—Short, drooping, thin, papery blade; fine silky fibre, but strips badly under present process of stripping; otherwise a very fine fibre.
6. *Katua Kawa.*—Resembles Awanga, but longer in leaf; not so thick or white in butts.
7. *Ngaturoa.*—Like Ngatunui but not so drooping; less colour in butts; not so strong in fibre, but still one of the best.
8. *Putaiori.*—Very thin butts; straight tall leaf; good fibre yielder.

A variety called Mukama—*muka* being Maori for fibre and *ma* for white—sold in London for £70 per ton. In strength of staple Phormium ranks next to silk, the relative breaking strains,

according to some tests that were made, being: Silk 34 lb., Phormium $23\frac{7}{10}$ lb., Russian hemp $16\frac{3}{4}$ lb., flax $11\frac{3}{4}$ lb., Agave Americana 7 lb. In the market it takes rank as cordage between sisal and Manila hemp, but it can also be used for making dress fabrics, handkerchiefs, and canvas. The leaves of Phormium are soft and flaggy and not spinous, facts that would appeal very strongly to the African labourer, for whom the handling of sisal and fourcroya leaves is rough, hard labour.

Many attempts have been made to get away from the machine process of manufacture known as "stripping," in the hope of getting better results by scraping, rolling, or chemical cleansing, but none of these have succeeded, and the stripper is still the indispensable means for separating the green vegetable sheath or covering from the fibre.

After passing through the stripper, the fibre is washed and then exposed to sun and air for drying and bleaching.

It then goes through the process of scutching. Scutching machines vary a good deal in detail of construction, often being built at the mill in accordance with the proprietor's or manager's ideas.

If the tow or waste fibre is of value it is usual

to use a separate press for baling it; this is not necessary, however.

Many millers apply a stream of water to the fibre as it is passing through the stripper. Others use a wet scutcher immediately after stripping. One or the other of these methods is of service in particular cases, but that depends on the character of the leaf and sometimes on the supply or quality of the water. In either case a centrifugal pump, about 3- or 4-inch, is usually needed.

For a single stripper mill, where power is required for driving, one stripper, one 2-man scutcher, and possibly a low-lift centrifugal pump, about 50 brake-horse-power, is required.

Water-power, steam, and suction gas are variously used.

Buildings are usually of the simplest description, being merely cover for the machinery and storage space for fibre awaiting scutching or dispatch.

The prices in the following table may be taken as a rough approximation of the cost of a single stripper milling plant.

Such a plant should be easily capable of putting through 10 tons of green leaf per day, equal to, say, 20 to 22 cwt. of finished fibre.

SECOND CROP OF MAIZE, 2½ MONTHS OLD, LOURENZO MARQUES.

To face p. 132.

	£	s.	d.
No. 9 Stripper *	45	0	0
Drum Dresser	1	10	0
Scutcher	40	0	0
Press (1)	25	0	0
Say 20 feet 2½-inch Shafting	4	0	0
4 Bearings	5	0	0
2 Collars	0	11	0
Main-drive Pulley	3	10	0
Drum- ,, ,, ...	6	0	0
Roller- ,, ,, ...	2	0	0
Scutcher...	2	10	0
Belting	15	0	0
Weighing-machine, Sundry Tools, Oil, &c., say	50	0	0
Buildings	100	0	0
Motive-power, say	300	0	0
Centrifugal Pump (if required), say	20	0	0
Erection of Plant	50	0	0
	£675	17	0

Maize is a staple crop with the natives, but no European has yet established maize-growing as his main business. The highlands of Quelimane may prove a good granary by and by, but in the district of Lourenzo Marques labour-saving machinery for, as far as possible, every operation, including steam-ploughing, should be taken advantage of if it is to prove profitable. The crop will not stand much hand labour. The culti-

* Booth, Macdonald & Co., Ltd., Christ Church, New Zealand.

vation of maize has been carried to a high pitch of excellence in the Transvaal, under the guidance of Mr. Butt Davy, Agrostologist and Botanist to the Union Government, and one of the first living authorities on maize. The influence of the Transvaal is being already felt in Lourenzo Marques, and maize-growing in the country will continue to develop under it.

CHAPTER XV

CATTLE-BREEDING AND DAIRYING

Cattle-breeding to the Province of Mozambique may be viewed from two standpoints: that of the breeder in the Lourenzo Marques district, where conditions are somewhat similar to those of South Africa; and that of the planter in the tropical areas, for whom cattle-breeding would never be more than a subsidiary industry.

The district of Lourenzo Marques, stretching from the basin of the Limpopo to the frontier of the Great Lebombos, is pre-eminently a grazier's country, and, further, one of the best grazing countries in South Africa. The native pastures never dry up as they do in the high veld; so with moderate stocking there need be no anxiety about a sufficiency of food in the winter months. There are probably over four million hectares of land on which cattle could be pastured, and, taking the proportion of stock they would carry at the moderate estimate of one

head per five hectares, the grazing capacity of the district amounts to 800,000 head. The total number in existence at present is 45,000. With the exception of the circumscription of Chibuto, north of the Limpopo, the district is now clear of East Coast fever, and, as far as is known, trypanosomiasis occurs only in a small area defined by the right bank of the Maputo River and the coast. Stock-raisers have therefore a clean field to begin upon.

It is not possible to say what breed of cattle is best suited for stocking these grazing grounds or for crossing with the native cattle to improve their weight and milking qualities and hasten their growth towards maturity, as systematic breeding only began with two or three herds when the country was cleared of East Coast fever a few years ago. Mr. Goldsbury, of Messrs. Merson and Goldsbury, Umbeluzi, prefers the Friesland. Six years ago the herd, reduced by the ravages of East Coast fever, numbered 23 head, of which 8 were cows. From these 8 cows an increase of 114 has sprung, a tribute to the Friesland cross, the Umbeluzi pastures, and, we may add, the judgment of these pioneer graziers of the Umbeluzi Valley. Recent purchases have brought the total up to 174 head, and operations are satisfactorily established for building up a

BREEDING HERD OF FRIESLANDS, GOVERNMENT FARM, UMBELUZI.

large and valuable herd of pure-bred and grade Frieslands.

Shorthorns and Frieslands are both being bred at the Government Experimental Farm, Umbeluzi. In 1910 1 Shorthorn bull, 22 cows, 3 bull- and 2 heifer-calves were imported. The bull died of heart-water, and it was deemed advisable not to replace it till a dip had been built, several months being thus lost. This original herd has now increased to 39. At the same time 1 Friesland bull and 6 cows were purchased, and these have increased to 20 head. The breeding herd at the Government Farm now numbers 41 Shorthorn, 24 Friesland, and 4 Aberdeen-Angus native half-breeds; total, 69.

The two favourite breeds are at present the Friesland and Shorthorn. Messrs. Merson and Goldsbury having adopted the Friesland, the Government Farm Friesland and Shorthorn, and Dr. Saldanha, also on the Umbeluzi, chiefly Shorthorn. These are three of the principal herds of the district. In those parts remote from the town, where milk production need not be a consideration, the Hereford, a hardy breed, or the North Devon, a lighter animal than the Shorthorn, from the milder climate of the South of England, may also prove suitable, especially if the pastures are scanty, both being better built for beef than the Friesland.

As a grazing country the district of Inhambane is inferior to that of Lourenzo Marques. The sparsely populated northern and western portions are to a great extent waterless, while the fertile, well-watered, populous south is infected with East Coast fever. When this part comes out of quarantine the question of restocking will occupy the attention of landowners, but for some time to come yet Inhambane is not likely to provide any attraction for the cattle-breeder.

Except in favoured spots in the interior, the heavy breeds of the south would be out of place in the tropic areas, which will never rank with the south as cattle-breeding countries. No one who wished to embark upon the business of stock-raising would select the Zambezi or Quelimane, much less Mozambique. But cattle are required there for draught purposes and for the local markets.

In connection with draught oxen an interesting circumstance has come under my observation which may be worth recording by the way, namely, that the further north we go the fewer the number of oxen can we yoke into a team. Spans of sixteen and twenty oxen are managed in South Africa, but in the equatorial belt one pair is as much as can be conveniently handled.

Between these extremes means should be adopted according to latitude. Last year I observed some wagons at work in the Quelimane district, each drawn by eight oxen, and it was apparent that spans of this size were beyond the capacity of the drivers to control. More work would have been got out of six. It follows from this that wagons, ploughs, and all agricultural implements should undergo a corresponding reduction in weight as we proceed north.

It will be asked how this is to be accounted for. It is, I think, the enervating influence of the tropic sun which forbids excessive and sustained exertion on the part of man or beast, especially of the white man, the source and support of all new activities. Cattle take longer to train in the Tropics than in temperate climates, and the training must be left more to the native, who himself begins by being less intelligent than his black brother of the south, requiring greater attention at the hands of the white man, who again is able to give him not more but less of it. Being unable to provide the requisite energy at one end, it becomes necessary to reduce the task at the other.

At the coast and also in parts of the interior the docile zebu is well known, but has hardly yet been taken seriously as an agent for im-

proving the local breeds of the province. Professor Wallace made the interesting discovery that underneath the white or light-grey hair of the zebu was to be found, in all but a small percentage of cases, a jet black or dark skin, a feature enjoyed by most species of African game that feed by day and would otherwise be exposed to injury by sunburn. Mr. H. L. Jones, chief veterinary surgeon of the Mozambique Company, is of opinion that zebu are undoubtedly suitable for the country. He writes :—

"The amount of trouble taken over them is practically *nil*, as they are brought in at night to the kraals, turned out in the morning, and left very much to the mercies of the sleepy herd boy, yet they almost invariably look well. Their progeny, no matter what the dam is, has the one constant quality of being able to thrive and fatten quicker than the progeny of any other kind of bull I have seen in this territory. Of course the better the cow the better the calf. We have some cows of the progeny of Shorthorn bulls, and the cross between them and a good Indian bull is very good, especially for beef and milk. The number of working oxen we have in this territory is small, and I do not know how these cross-bred Indians take to the plough and wagon. It was my intention to

breed from Madagascar cows and Indian bulls, as I feel sure the cross would be an excellent one. It would have the advantage of being a cheap way of improving the quality of our cattle.

"If an animal meeting the requirements of the country can be obtained in this way I do not see the necessity of importing expensive pure-bred animals from home. When Indian cattle were imported into this territory the losses were practically *nil*, but that has not been our experience with pure and half-bred Shorthorn bulls imported from Natal and Rhodesia. Whether the progeny of these Indian bulls have a higher degree of immunity than the local animal I do not know; but the fact that they keep themselves in such good condition must help them to resist many of the common diseases."

In a leaflet (No. 3) issued on March 1, 1912, by the Zanzibar Government on the researches of Dr. W. M. Aders into cattle diseases, the following paragraph may be quoted as confirming Mr. Jones's opinion:—

"Nearly all the dairy cows of Zanzibar town are of Indian parentage. These cows are good milkers and well suited to the climate. Many diseases which are common to Africa and would be injurious to European stock they resist. The

chief breeds of Indian cows and their milk capacity is as follows:—

Breed.	Bottles of Milk *per diem.*
1. Kathiwar cows	10 to 11
2. Sind	9 „ 10
3. Socotra	6 „ 7
4. Arab (Arabian)	7 „ 8
5. Somali (Benadir)	7 „ 8
6. Native of Zanzibar	1 „ 3

The bottles used run six to the gallon."

Zebu are a race of hump-backed cattle which inhabit India, East Africa, and Madagascar, domesticated from time immemorial; and though the word zebu is now generally used to describe the Indian race of hump-backs, of which a great many varieties have been produced through artificial selection, it is open to doubt whether the stock did not originally come from Africa. To their extreme docility must be attributed in some measures their capacity for thriving. Tropical Africa abhors bustle, whether in the genus *bos* or *homo*; and the shy, bustling breeds of cold latitudes are unsuited by temperament for hot climates. In addition to being good milkers and beef producers, zebu can be used as riding and pack animals as well as for draught.

Between the Zambezi and the Chiri is the island of Inhangoma. Inhangoma is in the

occupation of the Zambezi Company, who have established a farm and plantation at Bompona, opposite Mount Morrumbala, where they are breeding cattle. The herd of the estate numbers some three thousand head, and the stud six pure-bred Hereford bulls, which are put to selected native cows. Grade heifers will also be bred from; the grade bulls being sold to Nyassaland breeders, who give £12 and £13 for them. According to the strict ethics of breeding, grade sires are taboo, but the native stock of the country being so weedy these young half-bred Herefords are eagerly sought after by Nyassaland breeders, who rightly consider the main thing for the moment to be the increasing of weight, the breeding-out of impurities being the task of a future day. There is no East Coast fever at Bompona, and trypanosomiasis, if it exists, has not yet been detected. Herefords as a breed are not so heavy as Shorthorns, but they are hardier, and as graziers are unsurpassed. In selecting this breed for improving the Bompona herd the company, it would appear, was well advised, and it has the satisfaction of having established one of the most successful breeding enterprises in the Province. Good herds of native cattle are being reared at Marura and other spots on the Zambezi.

The districts of Lourenzo Marques and Inhambane were subjected to a policy of slaughtering-out to deliver them from East Coast fever. As practised in the Province, this is a system based upon the principle of killing all cattle within a radius of five miles of a centre of infection, with no regard to natural boundaries. A study of the introduction of the system leads me to the conclusion that the Veterinary Section of the Department of Agriculture was first established, not so much to investigate the local circumstances with a view to arriving at a conclusion as to what line of action should be taken to combat East Coast fever, as to give effect to a set policy—namely, slaughtering-out—previously decided upon. Slaughtering-out is the most drastic and unscientific policy possible to conceive, and before it was put into practice all other possible systems should have been well considered. For instance, on an outbreak being discovered I think that a policy of isolation should first be tried. This entails the visit of a veterinary surgeon to the spot to examine into all the circumstances; to put the herd in quarantine, stop all movements of grass and hay from the infected kraal, and all movements of cattle within a radius of a mile or so till the infected herd had been securely fenced in. The

alternative to slaughtering-out is a system based on quarantining, fencing, and dipping, and only when the infection is universally spread over a large area, which would involve too great an outlay to fence, should the extreme measures of wholesale slaughtering be resorted to.

Natives who have had their cattle destroyed are ruined as cattle-breeders for at least a generation, or until they have had time to forget the iniquities of the Government who first sent their agents to infect their cattle by cutting their ears and then to kill them for catching the disease. Such is the interpretation ignorant and superstitious natives place upon the procedure of the Government for diagnosing diseases through blood smears. It is impossible for them to understand what it all means. Cattle are much more than money to the native; they represent his wealth in the widest sense of the word. More than this they are his tame dependents, each of whom he calls by name. One day, for no reason at all that he can understand, for they are all perfectly healthy, an agent of the Government appears and orders his cattle to be destroyed. A native who has been treated in this way will never trust the Government again; he will never rear any more cattle, because for aught he knows the

Government agent may arrive at any time and repeat his outrages.

The labours of Dr. Theiler, of Pretoria, more beneficent perhaps than those of any man in the continent of Africa at the present day, seem to be on the point of being crowned by the successful treatment of East Coast fever by inoculation.

Stock-breeders in the Lourenzo Marques district, within railway communication of the town or in the suburbs, will find a limited market for milk. At present the supply of fresh milk is so small that the bulk of the milk-purchasing portion of the population — natives not coming within that designation — is compelled to use tinned milk.

As we have seen, breeders in the district are devoting their attention at present to the Friesland and Shorthorn breeds as agents for improving the native strains. Both are proving good grazers; but the Friesland is more famed for its milk-producing qualities than for beef, the Shorthorn excelling both in milk and beef. The merits of the two breeds as milkers is well illustrated in the following comparison, taken from a table in "The Agricultural Note-book" (McConnell). It represents the average of milking trials

of the British Dairy Farmers' Association for five years, the mean age of the Shorthorns being six years and one month, that of the Dutch six years and five months :—

	Days in Milk.	Daily Milk Yield. Lb.	Per cent. of Fat.
Shorthorn ...	42·8	... 49·2	... 3·91
Dutch ...	40·4	... 56·3	... 3·03

Expressed in measures of capacity, the Shorthorn gave an average daily milk yield of 4·9 gallons (22 litres), and the Dutch 5·6 gallons (25 litres).

In the list of eight breeds given in the table referred to the Dutch leads in weight of milk, the Shorthorn being third (cross-breds second); and in percentage of fat the Shorthorn is sixth and the Dutch last.

A small dairy of 10 Friesland grade cows on the Umbeluzi gives 50 $1\frac{1}{4}$-pint bottles *per diem*. This is equivalent to 0·78 of a gallon, or $3\frac{1}{2}$ litres per cow *per diem*, or 210 gallons per head per year, calculating that the cows remain in milk nine months. The average of the United Kingdom during nine months of the year is estimated at 450 gallons. The weight of milk for the milking period not exceeding eleven months, proposed as the standard for the Dutch breed by the British Dairy Farmers' Association for entry in the

"Dairy Cattle Register," is 8,500 lb. (850 gallons); that of the Shorthorn the same.

The Umbeluzi results are low, but allowance must be made for the fact that dairying operations have only recently been begun. Moreover, the cows are milked only once a day, the calves taking the remainder of the milk. Allowing an addition of 66 per cent. for this, the yearly output is increased to 348 gallons per cow. Another dairyman on the same river, crossing principally with Shorthorns, has 30 cows in milk, from which he sells 180 litres a day, milking twice; equivalent to an average of 356 gallons per head per annum. Some of the milk is also taken by the calves. The best races of zebu in Zanzibar (Kathiwar and Sind) yield $1\frac{2}{3}$ gallon *per diem*, equal to 448 gallons, during a milking period of nine months. They are fed on manioc, sesamum, oil-cake, maize, and cut grass.

There is, of course, but a limited market for milk in Lourenzo Marques. In the United Kingdom the estimated average number of cows per 1,000 of population is 103. According to the "Delagoa Directory," the population of Lourenzo Marques on April 17, 1904, the date of the most recent census, was: European races, 4,691; Asiatics, 1,690; Africans, 3,468—total, 9,849. Assuming for a basis of calculation that Euro-

peans and Asiatics could be counted as consumers, there is a market of 6,300 people to cater for. An average of 300 gallons per cow is probably all that could be relied upon—that is, 3 cows for 2 in England; 960 cows could, according to this, provide for the milk requirements of the town, or 32 dairies of 30 cows each.

The current price of milk in the market is 6d. per bottle ($1\frac{1}{4}$ pint), or over 3s. per gallon. Tinned milk probably costs householders at the rate of about $1\frac{1}{2}$d. per pint, or 1s. per gallon. A considerable reduction in price, though not necessarily to the level of tinned milk, would require to be made before dairy farmers succeeded in capturing the town market; 3s. per gallon being out of the reach of the ordinary consumer. At present dairying must be a highly profitable industry, as on a basis of 300 gallons each cow brings in £43 per annum gross.

CHAPTER XVI

FRUIT-GROWING

In a country where the fruits of the earth grow in abundance it will naturally be expected that good openings exist for fruit-farming, but an examination of the circumstances connected with the subject leaves the impression that there is probably but a limited future for the industry in the Province.

The most luscious fruit of tropical species comes from the tropical regions, and yet it is certainly safe to say that neither at Inhambane nor in any of the tropical districts of the Province would fruit-growing pay at the present moment, because there are no markets, excepting those of the small coast towns and passing ships, which can be and are catered for by natives. For the European market fruit must be picked and packed with care; with especial care in hot and humid climates where the keeping qualities of fruit are poor. Yet we find the

native with diminished intelligence and application as we approach the Equator, and the European with restricted capacity for close supervision. Except under specially favoured conditions the Tropics are not suited for growing fruit or any perishable product on a commercial scale.

For all practical purposes for some time to come the district of Lourenzo Marques is the only part of the Province that offers an outlook for the fruit-grower; his market being at present confined to the town. There is certainly the Transvaal, but as Transvaal growers send fruit to Delagoa Bay the presumption is that local growers would find a worse market in the high veld than at home. In the three years ending April 1, 1911, 5,782 packages of oranges and mandarins were imported into Lourenzo Marques. The orchards at present in existence are situated on river-banks principally, and though there is a great quantity of such land in the district much of it is subject to flooding. Fruit would, no doubt, grow on the hard and dry lands, but it certainly would not grow so well. On the rich bottom land the question would always arise whether lucerne, sugar, or some unperishable product would not pay better.

It is necessary, however, to determine with

such material as is available, how the case stands at present with regard to fruit-growing in the Lourenzo Marques district. Messrs. Merson & Goldsbury, of Umbeluzi, have a small orchard of 1,000 orange-trees, of ages varying from $3\frac{1}{2}$ to 10 years old. The most suitable varieties for the country, so far as experience has gone, are the Washington Navel and the Valentia Late. In 1911, from 300 trees 10,000 oranges were sold, the price obtained in the local market being 2s. 6d. per 100, wholesale. This is a gross return of 8s. 4d. per tree, or £60 per acre, reckoning the spacing from 18 feet by 18 feet, which gives 134 trees to the acre.

Stone fruit being by consent not a commercial proposition in this climate, where the trees would get no rest, tropical and sub-tropical varieties, chiefly oranges, will become the principal staple as far as fruit is concerned. The district possesses an advantage over Natal and the Cape in having an earlier season. The season at the Cape begins in June, that of Lourenzo Marques in May; there is thus but a narrow margin over Natal, which would come in between, and some of this would be lost through Natal being able to ship later for the same market. The efforts of local growers should be directed to producing a specially early variety of orange, as it is the

early market which is to prove their profit—a variety that would ripen in April; and to do this it would probably be necessary to forsake the southern nurseries for trees and turn to Zanzibar or Ceylon. The present varieties of oranges have been obtained from Natal and the Cape, but the fruit is not particularly luscious. Equatorial stock might give the fruit a distinctive character, thus securing a second advantage in Europe.

Considerable destruction occurred among the early planting by collar rot or gum disease at the base of the tree, believed to be caused by the trees having been planted too deeply. It is not considered safe to plant orange-trees at their normal and natural depth, but to keep them well up, even planting them on top of the ground and gathering the soil into a mound round their roots. It is difficult to understand why orange should differ from other trees in being subject to injury if planted at their normal depth. Injudicious irrigation had perhaps something to do with the trouble; leading the water round the base of the tree to puddle the soil into a paste excluding the air. That is treatment which is not only unnatural but useless, or almost so, as a means of supplying moisture for the tree. Trees feed through the root hairs which ramify at the

extremities of the root system, not through the large anchoring roots which radiate from the trunk. In an orchard of full-grown trees water should be led down the middle of the rows, and the soil round the trees, especially on low alluvial land, kept well stirred with the hoe to permit of good aeration.

While on the subject of irrigation a word may be said about overwatering plants, the frequent cause of mortality in the greenhouse or nursery. The evil effects of the practice were described by the Government Botanist of Cape Colony, in 1891, in the following amusing paragraph:—

"Madam sets out her flower-stand at the window with half a dozen fuchsias or geraniums, purchased in high condition from the nurseryman. She knows that plants want water, so every morning she pours the best part of a pint into each flower-pot with religious regularity. You know what happens in a few months. The fuchsias look ready to perish and begin to drop their leaves; the geraniums stop growing and buckle up. Then the gardener is called in to advise. He knocks the ball of earth out of the pot, and shows madam that all the roots have been sidling away from the heart and have made a close network, lining the sides of the pot. He points to the soil compacted at the surface and

perhaps covered with the first stage of moss growth. His verdict is that the soil has gone 'sour' through inconsiderate over-watering, and says the plant must be repotted. His practice is unimpeachable—it must be done—but his theory is all abroad. What is sourness? The fact is this gardening phrase is just a manner of speaking. One must not let people think we don't know. Think a minute, however. The constant water-pouring has closely compacted the earth till at the surface it is like wet mortar and is quite impervious to air. Trickling through the moss, it has long ago dissolved out and carried down to the saucer all the soluble mineral salts required by the plant. Here are the two causes that bring about for the roots asphyxia or stifling and starvation."

Budding the shields on to Seville or bitter orange stock instead of on to lemon has been suggested as rendering trees less liable to collar rot. It would also probably improve the delicacy of the fruit. Lemon stock gives a course rind and a characteristic oval shape to the early crops of fruit. The Pumelo and Seville orange are preferred as stocks in Ceylon.

The small Tangerine orange, known locally as nartje, flourishes at Umbeluzi, but the fruit of Tangerine is inferior in lusciousness to that of

mandarin, some very fine varieties of which are to be found in Quelimane.

The rough-skinned lemon is not popular, but late-bearing varieties that ripen during the hot season find a good demand for lemon squashes.

The mangoes of Lourenzo Marques are certainly not so good as those produced farther up the coast in the humid atmosphere of the tropics. The two favoured varieties are Bombay green and Natal yellow; but the flavour of the former, it may be remarked, is inferior to that usually possessed by Bombay mangoes, which are the best in India. Here, again, local growers would probably be wise to turn northwards for their young trees, and aim at producing a mango for the Transvaal market surpassing those of Natal for lusciousness, which the advantage of latitude should enable them to do.

On the Umbeluzi, in 1911, five-year-old Bombay green yielded 50 to 75 fruits per tree, which sold at from 10d. to 11d. per dozen in the local market, returning 5s. per tree gross. Natal yellow of the same age averaged 200 fruits, worth 4½d. per dozen—a gross revenue of 6s. per tree.

Avocado pear suits the soil of Umbeluzi, and though this tree takes a long time to come to maturity and is not very prolific, the fruit sells well, commanding 2d. to 3d. each in the local

market, and 6d. in Johannesburg. Seven- to eight-year-old trees yielded last year 50 to 60 fruit each. Avocado pears are considered particularly dangerous to eat unripe, though they should always be plucked before they are ripe, *i.e.*, before the yellow tinge appears.

Loquats grow into handsome trees, producing an abundance of flowers, but they do not fruit well. In India the tree blossoms twice, but it is only from the late autumn flowering that fruit is borne.

Sapodillas, on the other hand, bear well and the fruits sell for a penny each.

Much confusion prevails as to the nomenclature of the anonas, authorities differing even in text-books. The generally accepted popular names for the three principal species are as follows:—

Custard apple, or Sweet sop: *Anona squamosa.*

Bullock's heart, sometimes also called Sweet sop: *A. reticulata.*

Sour sop: *A. Muricata.*

These trees, besides being particularly liable to fly attack, are scarcely worth cultivating on a commercial scale; the fruit, especially that of custard apple, which falls to pieces, being very tender and subject to injury in transport.

A large variety of bananas are cultivated in Zanzibar, some of which might be well worth a

trial in Mozambique. The native names of the choicest kinds are: Sukari (two varieties), Kiguruwe, Kizungu (red and green), and the large plantain, Mkono-wa-tembo, for cooking.

A grey, fine pineapple, known as the Kew pine, could also be obtained there; celebrated for the size of the fruit (up to 17 and 19 lb.), the smallness of the core, the flavour and tenderness of pulp. It would probably pay to give pineapples a little more room than is usually granted them—$2\frac{1}{2}$ to 4 feet for large sorts.

CHAPTER XVII

LUCERNE

Many miles of river-bank in the district of Lourenzo Marques could be put under lucerne. It was Rhodes who said that any one with one hundred acres of lucerne need never do any more work—an assurance that, though it could scarcely serve as a text for the farmer, yet emphasizes the value of the product for South Africa.

It is certainly one of the products that deserves special attention on the part of any one who contemplates taking up land in the southern and subtropical district of Portuguese East Africa, though it probably does not possess the same value there as for the farmers of the high veld, who have to provide fodder for winter feeding. The requirements of the local hay market could be amply provided for by one hundred acres under irrigation. The Transvaal market appears to be well stocked, lucerne hay selling in Johannesburg for

2s. 6d. to 4s. 6d. per bale, compared with 6s. in Lourenzo Marques.

Lucerne is an irrigation crop—that is to say, unless it is grown under irrigation it is probably not worth growing at all. Mr. Burtt-Davy, Government Botanist of the Union Department of Agriculture, discussing the relative merits of irrigation versus dry lands in the Transvaal, wrote: "My conclusion is that, though on such soils (heavy clay loam with pot-clay subsoil) dry land lucerne will not be a success as a forage or hay crop, it gives a useful amount of early spring and late autumn grazing." The latter consideration scarcely appeals to Lourenzo Marques with its evergreen pastures. At the same time lucerne is one of the best drought-resisting plants in cultivation, sending its roots deep down into the subsoil in search of moisture. The argument for irrigation is based on the greatly increased yearly revenue, corresponding to a greater interest upon capital outlay, the cost of establishing a stand being on the whole the same in both cases.

Lucerne, being a deep-rooting plant, requires well-drained land, and should not be planted on swamps or water-logged clays unless first drained. The best soil for lucerne is a deep, rich, calcareous loam, lime being its dominant manurial ingredient. When levelling the ground for irrigation

it should be borne in mind that the surface soil is the storehouse of plant-food, and that if the land in the process of levelling be denuded of its top layer at any spot the effect is likely to be felt subsequently in thin and stunted growth. Fine tilth is required for the small seed; and as the plant is to remain in the land several years repeated harrowings at intervals in hot, dry weather are necessary to cleanse the land of weeds. It would be a mistake to plough and harrow the land and then go on to plant, as we can do with maize. Cut-worm being the principal enemy of lucerne in the country, it may become advisable to bait the land with poisoned grass before planting.

It is better to sow in drills than to sow broadcast when land is to be irrigated, because drilling permits of the use of light Planet-junior hoes between the rows. Stirring the soil with these small hoes not only kills the weeds, but is the best means of restoring mellowness to the land after it has been caked by irrigation. Rows may be 12 inches apart and made across the slope of the land to catch the water and insure even distribution when irrigating. About 15 lb. of seed per acre is probably what this alluvial land requires, allowance being made for some loss through cut-worm and perhaps not quite fresh seed. After testing all the prin-

cipal known varieties and strains of lucerne, the Transvaal Department of Agriculture obtained the best results with Australian seed from the Tamworth and Hunter River districts, and with Oudtshoorn seed, the latter, however, being often found to contain dodder and other weed seeds. Seed from Provence, in the south of France, also proved good.

Under irrigation, cuttings can be taken once a month during nine months of the year, *i.e.*, from September to May, and yields of between five and six tons are obtained from a $2\frac{1}{2}$-year stand. The local price at present is 6s. per bale of 45 kilos—£6 12s. per ton metric. With a yield of five tons this gives a gross return of £33 per acre. Prices could not, of course, be expected to remain at their present level if the supply underwent any considerable increase. Veld hay sells for from £2 to £3 10s. per ton.

Water is turned over the land for three days after every monthly cutting, the quantity distributed being equal to a mean supply of 45 inches in depth during the twelve months. This quantity appears to be ample for the black alluvium of the river-banks, which is liable to cake if too much is applied. The harrows or hoes should be passed over the ground after each inundation, when the soil is dry enough to break up the surface crust.

Precautions must be taken to prevent the seeds of water weed being distributed through the lucerne, entailing heavy subsequent loss to eradicate. A piece of fine wire gauze over the mouth of the suction-pipe should suffice for this.

The abundant supply of natural pasture, even during the driest time, make it doubtful if it would pay to grow lucerne under intense cultivation exclusively for feeding cattle. Many years must elapse before the natural pastures become fully stocked. But lucerne benefits by light grazing, and it will probably constitute an important detail in the management of a stand when once established, say the third year, to turn on stock after the season is over. It is probably the cheapest way of killing the weeds, at the same time manuring the ground. The danger of cattle becoming blown through being left too long at one time to pasture upon highly succulent food should be guarded against. The feeding value of lucerne hay is about half that of maize. Perhaps one of the most profitable ways of utilizing a stand of lucerne within easy access of the market would be to soil the crop to pigs.

CHAPTER XVIII

VANILLA

On the fertile, well-drained soils of Quelimane, such as are to be found along the new line of railway between Inhamacurra and Fort Durão, the cultivation of vanilla, nutmegs, cinammon, and other spices will probably attract attention when settlers begin to enter the country. Of these vanilla is chiefly identified with the East Coast of Africa.

The vanilla plant is a creeping orchid requiring artificially provided supports over which the vines can be trained. The flowers must be artificially fertilized, and the pods or beans, the vanilla of commerce, must undergo a system of curing in order that their natural aroma may be fully brought out. It is a fleshy plant, demanding a humid climate and a plenteous supply of moisture, which, if rainfall is deficient, must be supplied by irrigation. A proper control of shade is another condition of success. The endeavours of the

Photo,] [*Gomez, Zanzibar.*

VANILLA PLANT, SHOWING PODS, GROWING ON JATROPHA CURCAS, ZANZIBAR.

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planter are directed towards inducing the vanilla to flower, as without a good flowering he cannot expect a good crop of fruit. He therefore regulates his shade to let as much light as possible into the plantation without allowing the sun's rays to strike the vines.

The roots of vanilla are of three kinds, but only the aerial roots, which hang down and enter the soil or strike from the buried end, concern the planter. These tender roots creep along the surface of the ground, or just underneath it, and are liable to rot if there is too much moisture, or to rupture if the soil becomes too dry and cracks. Clay soils should therefore be avoided, as also light sandy soils that heat intensely in the hot weather. Well-drained loams are the most suitable.

The light natural forests of Quelimane, by thinning out here and planting a tree there, would provide good natural top shade; and where it is required to plant, a selection can be made from quick-growing trees such as *Grevillea robusta*, *Erythrina*, *Pithecolobium*, Ceara rubber, Central American rubber. Flamboyant and the many species of ficus monopolize the surface with their roots and should be rejected.

The vanilla is not trained up these shade trees, though it will climb them whenever it gets an

opportunity, holding on tenaciously with its clinging roots.

When it does this it must be torn down and looped over the supports in order that it may not get out of reach, and also that its aerial roots may develop and strike down into the soil.

There are three systems of supporting the vines, the simplest being by fences of posts and rails or wire. The objection to this system is that the fences rot in time and must be renewed, and that the vines intertwine and grow into a tangled mass excluding the light and air, incapable of being pruned. The second system, that of planting rows of live supports in the form of fences, is open to the same objection of inducing an unwieldy mass of creepers impossible to control.

The best method is to plant the cuttings two or three close together in rows 6 or 9 feet apart, the same distance separating the groups of cuttings in the rows. Each group carries one vanilla plant, which can be trained and pruned and controlled as required.

The most suitable plant on this coast for live supports is the physic nut tree, *Jatropha curcas*, common in Lourenzo Marques and throughout the Province. The pergolas of jatropha at Manhica, one of the botanical features of the

Incomati, would provide cuttings without injury to themselves for several vanilla plantations. Frangipani, anatto, and hibiscus may also be used; though anatto is apt to become too leafy, and frangipani too bare of leaves. Cuttings of jatropha should be 4 or 5 feet long, branched if possible for over-looping the vines, and should be planted in the ground to a depth of 1 foot. They strike quickly, producing leaves in a few weeks in good growing weather.

Vanilla is propagated by cuttings, and as roots strike from every joint in a healthy slip there is a temptation to plant short lengths of 3 feet or less to make the plants go as far as possible; but this is mistaken policy, as by planting short lengths the period before the first flowering may be extended to four years. Cuttings should be at least 6 feet in length; if 9 feet some of them will flower in two years. Cut the leaves away from the bottom three nodes, and plant this naked strip in a shallow hole at the base of the jatropha, allowing the extremity of the cutting to curve upwards and protrude about 2 inches to prevent it rotting. Loop the vine over the live supports, securing them gently with palm-leaf ties; mulch the ground at the base of the plant with a thick layer of grass or leaves.

For the next two years work in the plantation will consist of training the vines over the supports as they continue to grow, protecting them from the sun's rays; keeping their roots well mulched and the ground clean of weeds. In the depth of the rainy season it may be necessary to open out the mulch and give the sodden ground an opportunity to dry, but it must be closed up again in good time lest the delicate bleached roots get touched by the sun and wither.

The first flowering may be expected the third year, and in Quelimane the season would probably begin in September or October. Some months before this the growing points of the vines should be nipped back, in order that the energies of the plants may be directed to producing flowers. Nipping back the growing ends as they reappear, and training the last length of 3 feet upon which the flowers will form, so that it hangs down and is free to enjoy a full measure of light and air, will be the principal work till flowering begins. A vanilla flower blooms for one day; pollination must, therefore, be performed the day it opens. The process is a very simple one, consisting in lifting with a slender sharp-pointed stick or long thorn the lip of the male organ containing the pollen mass and pressing it gently down upon the female organ

beneath. Native boys become very expert, and after a little practice fertilize four or five hundred flowers in a morning. The flower falls in a few hours if vitality has been destroyed by too severe pressure, but persists if fertilization has taken place.

The capacity of the plant must not be overtaxed; and three or four bunches of flowers, each bunch with five or six pods, will be sufficient to leave. One bean, 8 inches long, is worth twice or more as much as two beans 4 inches long, so nothing is gained by leaving too many pods on a bunch to reduce the average length. From eight to nine months will elapse from the beginning of flowering to the beginning of harvesting. Hitherto the various operations have been more or less of a mechanical nature, easily performed by the ordinary African, but harvesting can only be carried out by experienced, reliable, and intelligent men. A bean is ripe when it begins to turn yellow at the tip, the requisite tinge being recognized by experience. If plucked too soon it will shrivel in the curing and become hard and dry; if left too long the end will split; to the serious detriment in both cases of the market.

In the afternoon the beans harvested that day are plunged for a few seconds into a cauldron

of hot water just upon the simmer, though not actually boiling. The usual method is to fill a basket with the beans and dip it slowly two or three times into the cauldron. While hot and steaming the beans are piled into a heap and kept covered with blankets till the morning.

In the morning they are spread out between blankets in the sun on stages of bamboo or light timber, and kept thus covered for a week or ten days till the colour has deepened to a rich chocolate—being of course brought in at night or whenever it rains. Thereafter they are spread out on bamboo or trestle shelves in the drying house, constructed to admit of a good circulation of air and not much light. Two or three months may elapse before the beans are dry, and during that time, having a tendency to curl, they are straightened out with finger and thumb and undergo a preliminary sorting through separation of the split from the sound.

Condition being the same, market price depends upon the length of the beans, the price decreasing in the ratio of 1s. 6d. to 2s. per inch. That is to say, 8- to 8½-inch beans being worth 18s. a lb., 7½ to 8 would probably be worth 17s.; and as a bundle is classed according to the length of its shortest beans, care must be exercised in the grading. The "trade" is also very particular

about the appearance of the bundles and the size and shape of the tins in which they are packed. Fifty or sixty beans may be put in a bundle, which must be neatly tied with the curled base of the beans pointing inwards. Again, bundles differing in length by more than an inch should not be put into the same tin. If harvesting and curing has been properly done, the beautiful white needles of vanillin will begin to crystallize on the beans soon after bundling.

An acre of land planted 6 by 6 feet contains 1,200 plants. Assuming that in a plantation in full bearing an average of two-thirds of the plants flower yearly, and that each plant carries 20 pods, we get a crop of 160,000 pods per acre. Taking long beans with short, we may estimate an average of 140 beans to the pound, which gives us 114 lb. of dried vanilla to the acre. Price may vary from 2s. 6d. or less for mouldy or split to 18s. or even 21s. in a good market for long, well-cured beans. Calculating upon an average of 7s. per lb., the gross returns work out at £40 per acre. Good management should keep the cost of production within 40 per cent. of this.

Vanilla-planting has certain advantages over such industries as cane- and sisal-planting. The work is far less laborious and better suited to the languid disposition of the tropical African, and

especially suited to children, whose deft fingers enable them to manipulate the flowers and beans better than men. No costly machinery is required, and there is no heavy transport problem to face. A ton of fibre may be worth £25, a ton of vanilla £800. On the other hand, it is necessary to bear in mind that vanillin is a spice for which there is but a limited demand, and that it is artificially prepared on a commercial scale from the oil of cloves.

CHAPTER XIX

DRY FARMING

The interest that is being taken in dry farming, and the success with which it is practised in Western America, compel the attention of the farmers and planters in all countries that have an absolute deficiency of rainfall, or that suffer from a long dry season, as many parts of the Province of Mozambique do.

Plants can only absorb food when it is in solution, and they feed, it is believed, not with the rain that comes down, but with the moisture that comes up charged with soluble nutritious salts. The rain first soaks down to the water-level, and when the particles of soil are very finely divided, as in clayey soils, the suction exerted keeps the plant well supplied with moisture. Dry farmers tell us that, in order to increase this capillary attraction, the subsoil must be compacted. A writer (Mr. E. J. Russel) in *Nature* (November 24, 1910), reviewing recent

literature on the subject of dry farming,* points out that, while it is usual to suppose that the compactness of the subsoil facilitates the upward lift by surface tension of water from the permanent water-table, it would seem equally rational to suppose that the compact subsoil retards the percolation of the water. In other words, hinders drainage.

Another article of belief held by dry farmers is that by keeping the surface stirred while the crop is growing a soil-mulch is created which checks evaporation. But, as Mr. Russel again states, the function of this loose top layer is not settled. "It is commonly regarded as a break in the structure of the soil leading to a rupture of the capillary films of water. It may equally be a nonconducting layer, shielding the mass of the soil from the sun's heat, and therefore lessening evaporation." A protest should be entered against the principle of frequent hoeing being claimed as a dry farming monopoly. A loose surface layer enables the air to penetrate the soil, supplying oxygen to the bacteria of nitrification, whose activities are thereby increased, and by keeping

* "Transvaal Agricultural Journal," vol. viii, 1910; "Agricultural Journal of the Cape of Good Hope," vol. xxxi, 1910; "Water Requirements of Crops in India," by J. W. Leather (Memoirs of the Department of Agriculture in India).

down weeds prevents plant-food from being diverted from the crop. This is beneficial, not to dry lands only, but to all lands, though we have to thank the dry farmers for directing attention to the supreme importance of the hoe in successful agriculture. Air promotes evaporation, and in so far as the mulch extends moisture is probably being continually lost.

Dry farmers are on safer ground when they insist on the fallow as a means for conserving the moisture of the soil. Lawes and Gilbert found that, for barley, 257 lb. of water were transpired for every pound of dry matter produced ; Wollny gave 774 lb. Plants transpire more water per pound of dry matter produced in a poor soil than in a rich. This may be due to the moisture absorbed being less concentrated in soluble plant-food. Leather found that the proportion of water transpired was less on manured than unmanured soil. Manure can thus take the place of water to some extent. A plant may be regarded as a pump sucking up the moisture from the region of the soil searched by its roots and dissipating it into the atmosphere. It is easy to understand that if we keep our land free from plants for six months or a year we shall effect a great economy in water and store up accumulations of rainfall for a future crop.

We are, as a matter of fact, getting back to the practice of our forefathers, with whom the bare-fallow held an indispensable place in the rotation. They called it "resting" the land; and often the land was left too severely alone, falling under weeds, which of course transpire water also, though not to the extent of highly developed cultivated crops. Then came the modern farmer with his fallow crop of turnips, which he fed off with stock, confounding the old-fashioned bare-fallow farmer, who had no theory with which to back up his practice. In any case, with modern mixed farming, provision had to be made for wintering stock. In readopting the fallow, the dry farmer, with a clear grasp of the function it fulfils, is not content to leave the land to "rest," but by frequent cultivation keeps down weeds, aerates the soil, and maintains his mulch.

Until dry farmers have proved what exactly is the result of compacting the sub-soil, planters in tropical countries should be cautious of making it a part of their practice, especially in low-lying lands, unless, indeed, nothing more is meant than deep ploughing or disc harrowing, as explained by some writers, though it is not quite clear how harrowing or even ploughing can compact the sub-soil. They incur the obvious risk of checking drainage to the detriment of the crop. Frequent

STEAM HARROWING, BOMPONA.

hoeing is as important there as in temperate countries, but what of the value of the fallow? The system of dry farming, in which the fallow is an important item, is advocated for countries with a rainfall of from 10 to 15 inches, or, as some authorities state, 10 to 25 inches. All appear to agree that with a rainfall below 10 inches irrigation is necessary. As there is no part of the Province of Mozambique with less than 15 inches of rain, it would appear that fallowing is not required. But the sun is much stronger in the tropics than in temperate latitudes, and more water is caught and evaporated again before being able to escape to safety below than would be the case in colder climates. A rainfall, say, 25 inches, sufficient for the needs of a crop in high latitudes, would amount to nothing short of drought in equatorial regions. It is an open question whether Lourenzo Marques does not come within the limits of fallow farming; and it is a point that could usefully be made the subject of experiment.

CHAPTER XX

THE NATURAL FORESTS

The great proportion of the surface of the Province is timbered—in the south as semi-afforested low veld, in the north as low tropical forest—but I do not think timber will ever become an important article of exportation from the colony because of the cost of transport. Only if there are found to be large areas with particularly valuable timber trees thick upon the land, and near to water transport, making it worth while incurring the expense of opening sawmills, will there be a prospect of a lumber industry arising. This, however, as well as the examination of the forests for balata, gums, dye, bark, cordage, drugs, rubber, gutta, and other economic products, is a matter for future investigation. The chief value of the forests, in my belief, exists not in the expectation of the discovery in paying quantities of any valuable commercial product, but in providing timber and fuel for domestic use for future planters, and

building material, fuel, cordage, and bark cloth for the natives. We have an example in Inhambane of a country having been denuded of its forests, possessing no timber and no fuel, or very little, and the Government should take steps to prevent other parts of the territory being overtaken by a like fate. Certain lines to be followed present themselves to the mind; but it is necessary first of all to accept the fact that the vast proportion of the forest area is destined to be cleared to make room for the cultivation of valuable products of commerce, and that there is no point in spending money in conserving timber doomed to the stubbing machine and the flames. Regulations that may be made should not be of a hampering character calculated to hinder the free expansion of new industries. Accepting that position, it would be necessary to make provision for the preserving of forest belts or blocks at convenient intervals. These reserves could be thrown open by rotation to permit their being resorted to for the collection of firewood, and for the cutting of timber for fencing and building, and then closed again for a renewal of growth. I doubt the wisdom of preserving particular species, as, for example, has been done in the case of *Acacia nigrescens* in the south. A tree that is valuable for its timber can only be

used once, and as it has to be cut before it can be used, no object is gained in deferring that operation. It matters not in the end whether the tree is cut this year or next. Trees in a forest reserve would naturally be protected in order that when the reserve is closed the species may be reproduced, but the reproduction of the species of one particular tree is extremely improbable if the destruction of its sheltering companions round about is permitted. Forest areas rich in trees that produce valuable commercial products should be reserved *in toto*, not the valuable trees only in them.

Forests it is believed exercise an influence upon the rainfall of a country, but this is an aspect of the question upon which too much importance should not be attached in the Tropics, because the trees that are cut would, to a great extent, be replaced by other trees planted. Many of the economic products of tropical countries are produced by trees ; far more so than is the case with those from temperate climates. Again, the planter requires shade and shelter belts both for himself and often for his plantation, so that in one way or another tree growth in fertile tropical lands proceeds rapidly ; indeed is not easily kept down. At the same time the reserves of natural forest would, as a rule, consist of loftier trees, and might

possess a climatic value over that of cultivated trees.

The only timber of the Province that is an established article of commerce in Europe is a species of *Copaifera* (?) known in Angoche as pinki, and popularly as African ebony. The forests of the Mozambique district are, in places, rich in pinki, but the tree is also found in Quelimane and Lourenzo Marques. It is brought in by the natives in metre lengths weighing from 40 to 50 kilogrammes according to girth, and bought by merchants at from 7s. to 8s. per 100 kilos. It is sold in Marseilles for from £8 to £20 per ton according to quality, the lowest quality going to Hamburg and fetching £5 per ton.

Euphorbia Tirucalli, the source of almeidina gum, now being exploited in Natal for its rubber, occurs in Lourenzo Marques, but not sufficiently abundantly, as far as is known, to make it worth while exploiting in its natural state. The dry sandy soils of Lourenzo Marques suit it admirably, and as it grows readily from cuttings it possibly might pay to cultivate. It should, I think, be planted thickly in the ground in the manner suggested for Ceara rubber, and allowed to grow up into a jungle, in which no weeding would be required ; a crop taken every year or two years

and the leaves and stems put through machinery for the extraction of the latex. If Tirucalli will anywhere pay to cultivate it is in Lourenzo Marques, where thousands of acres of the sandy soil that it loves await their crop.

CHAPTER XXI

THE MANAGEMENT OF MANGROVE FORESTS

Science has classified the different species of mangroves, but that is as far as it has as yet ventured. It is only imperfectly understood what species provide the tanning bark of commerce, and no definite principles for the exploitation and preservation of forests have yet been laid down. The regulations controlling concessions in the Province stipulate that, after barking, mangroves must be cut down at the junction of the roots and stem, so as not to injure the roots, and that the timber so cut must be removed within three months to a place chosen by the administrator of the circumscription.

This implies that red mangroves coppice, that is, send up new shoots from the bole after the trees have been cut down, and that if the dying or dead trees are left standing young growth will be obstructed. As far as I was aware, though I had not particularly investigated the point, red man-

groves did not coppice, and even if they did I could not conceive that the standing dead timber could interfere much with the growth of the young trees.

At Angoche I took the opportunity of inspecting some forests which had been worked through. I found *Avicennia Officinalis* sprouting but no others; and I believe this so-called white mangrove to be the only one of the many species that line the estuaries of the rivers that sprouts again after being cut down. Certainly *Rhizophora mucronata*, the principal if not the only source of mangrove bark of commerce from Mozambique, does not coppice. When the tree is barked it dies, root and branch.

Next, as to whether cutting down the old trees is necessary for the welfare of the young plants, I found opinions divided on this point. One authority, who had been in the mangrove business seven years and has large concessions in the territory and in Madagascar, gave it as his opinion that it was necessary to cut down the trees after barking, otherwise the young trees could not obtain the light, air, and room they required. Others whom I consulted were equally emphatic in insisting that the cutting and the removal of the dead trees were quite unnecessary. I was predisposed, I confess, to agree with this view, and my observations at Angoche confirmed me in this

RED MANGROVE, LARIDI, ANGOCHE

Note orchella weed growing on branch in foreground

opinion. Up the estuary from Parapat to Quiloa, one of the estuaries of the many small rivers that converge in that region, the banks are lined with dead mangroves, standing uncut, and among these an abundance of healthy young mangrove-trees is growing up, providing conclusive evidence that leaving the old dead trees has not interfered with new growth. I am rather inclined to think indeed that the dying and dead trees contribute to the welfare of the young plants by preventing with their roots the scour of the mud till those of their offspring have taken possession. Cutting and removing the dead trees is a considerable expense, particularly if, as sometimes occurs, the spot chosen by the administrator to which they are to be taken is a considerable distance away. In some cases the regulation is ignored, it being impossible to comply with it, and the means at the disposal of the administration not being sufficient to see that it was properly enforced. Thus it presses unfairly on those who carry it out, or endeavour to do so.

One argument only can be advanced in support of the practice of cutting down the trees, viz., that the bark of the upper branches which might otherwise be left can all be stripped off, but this is hardly a matter for a Government; for, though a Government may lose something in duty, it is the

concessioner who pays for the labour and is the principal loser if the labourers waste his bark. The bark is his property, and, therefore, it is a matter in which a Government cannot, I think, properly interfere.

One species of mangrove yields the bark of commerce, viz., Mtulu (*Infise*) (*Rhizophore mucronata*). This is known as Mzinii in Zanzibar, and by other names in German and British East Africa. Whether or not this is the only species I cannot say, and do not think that it very much matters. I have devoted a considerable amount of study to the source of commercial mangrove barks, and my experience is that reliable information is most difficult, if not impossible, to obtain. Only prolonged personal study in different parts of the coast could satisfactorily clear up the matter, but mangrove forests being hot, unhealthy regions of deep mud usually infested with mosquitoes, Europeans can only investigate them thoroughly at the expenditure of much time, not unattended with considerable risk, which is not often available. We are compelled to trust largely to native accounts, which are never wholly to be relied upon. The species known as Mikandaa (*Mucandara*), a native name common all up the coast, is *Ceriops candolleana*. It yields a fibrous bark of no commercial value, yet it is a valuable timber for

house-building, providing rafters for the roof and uprights for the wall, and is, therefore, worthy of protection along with the other species of so-called "red" mangrove.

The three main principles upon which I think mangrove forests should be controlled are as follows: (1) The barking of all trees in an area should be prohibited; mature trees should be left at intervals of a few yards for the purpose of producing seedlings for the restoration of the forest. (2) An area worked through should be closed for ten years or until such time as the growth of the forest has been restored. (3) A marginal reserve of 30 feet should be left to prevent the banks being washed away.

CHAPTER XXII

RAINFALL AND TEMPERATURE

In a tropical country fertility depends upon rainfall quite as much as upon actual richness of soil, provided always the soil has depth. Some years ago I sent a sample of soil from a plantation in Zanzibar to Dr. Voelker, consulting chemist to the Royal Agricultural Society of England, for analysis. The report stated that the soil was "of a miserably poor character," "clearly quite impoverished"; "in all the constituents which are needed to make a soil fertile this one is exceptionally deficient." It seemed, indeed, "a question whether such a soil would bear the cost of any large outlay in manuring of an artificial nature." On receiving this report I explained that, generally speaking, the vegetation of the plantation was luxuriant, and that this might be accounted for by the well-balanced supply of sunshine and rain, and that under favourable climatic conditions crop production

may be good, although a soil may be intrinsically poor. Dr. Voelker replied that he was much struck with the same fact when in India, adding, "It is very evident that these conditions must have a most marked influence in enabling crops to provide themselves with food. There can be no doubt, I think, that under such conditions what food supplies there are in the soil become more quickly available than where we have such a climate and physical conditions to deal with as are met with in England." This plantation, of some fifty acres in extent, with soil "of a miserably poor character," has recently been sold for £3,000.

It had a mean and annual rainfall of about 75 inches, and to this fact, and the extreme humidity of the climate holding evaporation in check, is to be traced the fertility of its soil. The nearer we get to the Equator the greater the power of the sun for evaporating moisture, altitude being equal, and the greater the annual rainfall required to permit of a sufficiency of water escaping from the pull of the sun to the safe haven of the water-level beneath. In a temperate climate a fall of 30 inches of rain would be a sufficient if not a generous allowance, but in an equatorial climate it would amount to a drought. We have to think of the soil as a great sponge soaking up water from subter-

ranean reservoirs, the function of rain being to sink in and replenish those reservoirs, repairing the loss caused by the sun continually pumping water out through the leaves of plants, which of course utilize this water by feeding upon the salts it has collected from the soil and carries in solution. When the soil has no depth, that is, when there is a stratum of rock or gravel within a few inches of the surface, water cannot be soaked up from below, and the little moisture contained in the shallow surface layer being soon dissipated plants wither.

Not only the weight of rain and latitude of the country, but the distribution must be studied if a correct idea of the meteorological conditions of a country is to be formed. It is obvious that if the rain falls as torrential downpours within the space of a few weeks, a large portion of it must be lost as storm-water carried out to sea in swollen rivers. Yet it is a feature of tropical rain that it falls in great volume within defined seasons, and though this gives rise to a great wastage in storm-water, yet we can see that in a hot country only by obscuring the face of the sun, and checking his evaporating power continuously for a period, and deluging the parched earth can Nature ensure an adequate supply of water soaking through to raise the subterranean

reserves to their necessary level. In a tropical country we should, therefore, look for a heavy rainy season as an indispensable condition of natural fertility, with a liberal margin of rain left over for distribution throughout the rest of the year. It will depend upon the kind of crop we wish to grow whether or not we require a long dry season as well; or, put conversely, the selection of crop will then depend upon the length and reliability of the dry season.

The Quelimane District.

Complete records, extending unbroken over a large number of years, necessary for a proper study of the rainfall of the Province, are not available, yet from such as are available a very fair idea can be obtained. In the following two tables the statistics have been arranged in two groups, the first being cocoanut plantations at the coast:—

Coast Plantations.

	1908.	1909.	1910.	1911
	Inches.	Inches.	Inches.	Inches.
Porto Bello... ...	76·79	53·43	78·89	96·39
Brigodo	68·13	32·21	45·55	—
Maballa	75·15	41·49	62·98	87·39

1911—7 months, January–July.

The average fall for the three years 1908–10 at Brigodo was 49·68 inches; that at Porto Bello, only 10 kilometres distant, 69·70 inches.

Inland Plantations.

Inhamacurra, 5 months, Jan.–May, 1911, 64 inches.
Mudira, 6 months, Jan.–June, 1911, 76·59 inches.

Inhamacurra, on the river of that name, is a sugar and sisal plantation, distant from the coast 69 kilometres; Mudira is a Ceara rubber plantation, 110 kilometres from the coast.

The reading for Mudira for June was 1·87 inches, leaving for the five months January–May 74·72 inches, compared with 64 at Inhamacurra.

It is generally considered in Quelimane that the rainfall immediately inland is greater than that at the coast, but the figures for 1911 do not bear out this view. For the corresponding five months in 1911 the coast readings were for Porto Bello 85·91 inches, Maballa 77·76 inches. In the mountainous region towards the British border precipitation is probably greater.

The greatest falls of which the writer has any record are, in inches, in one month: Mudira, 32·76; Porto Bello, 33·15; Maballa, 33·18, all in January, 1911. In twenty-four hours, Porto Bello, 8·58 inches on April 19, 1908.

The Zambezi.

The following are the records for the three sugar plantations on the Zambezi and Bompona on the Chire. Marromeu is approximately 60 miles from the mouth of the river, Mopea 95, Villa Fontes (also called Caia, Sena, Changadia and Shumbwe) 130, Bompona 150:—

	1907.	1908.	1909.	1910.	1911.
	Inches.	Inches.	Inches.	Inches.	Inches.
Marromeu ...	—	48·19	27·80	41·30	50·04 *
Mopea	—	46·77	25·72	39·45	41·45 †
Villa Fontes ...	37·07	37·63	32·10	35·04 ‡	—
Bompona ...	—	—	—	—	46·79 §

These figures indicate a decrease in rainfall as the river is ascended, with a slight recovery at Bompona, due perhaps to the proximity of Mount Morrumbala.

The highest monthly readings were at Morromeu 18·44 inches, Mopea 13·58, Bompona 17·54, all in January, 1911, and Villa Fontes 13·86, February, 1910.

* To December 15th.
† To December 13th.
‡ To June 30th.
§ To December 10th.

Mozambique.

The only records available for this district of Mozambique are those of the capital town, situated on the island of Mozambique, and none of these refer to late years:—

Mozambique Island.

1901. Inches.	1902. Inches.	1903. Inches	1904. Inches.	1905. Inches.
27·54	20·06	33·31	18·82	30·48

The greatest falls were: in one month, 9·77 inches in February, 1901; in twenty-four hours, 4·30 inches on February 11, 1901.

The rainfall on the mainland is believed to be greater than on the island, but if this is so the difference must be slight, judging from the appearance of the country. In beyond the Chinga range the conditions are no doubt better.

Inhambane.

Captain Cardozo, of Inhamusua, and Mr. Pecastaing, of the Inhambane Sugar Estate, Mutamba, were kind enough to furnish me with their records:—

	1906. Inches.	1907. Inches.	1908. Inches.	1909. Inches.	1910. Inches.	1911. Inches.
Inhamusua ...	—	48·51	28·93	48·00	42·81	27·19
Mutamba ...	59·10	63·49	35·15	47·91	45·66	36·39*

* To end of August only.

Inhamusua, 10 kilometres from the coast in the circumscription of Maxixi, had an average fall for the four years 1907–10 of 42·06 inches, compared with an average for the same period of 48·30 inches at Mutamba, on the River Mutamba, at the head of the Inhambane Bay.

The maximum monthly fall at Inhamusua was 17·30 inches in January, 1909, and at Mutamba 25·11 inches in November, 1906.

The following table is compiled from the report of the Observatorio Compos Rodrigues em Lourenco Marques for the year 1910 :—

	Inches.		Inches.
Inhambane ...	48·94	Morrumbene ...	42·21
Villanculos ...	42·49	Chicomo	29·51
Massinga ...	52·10	Panda	33·12
Panga	39·27	Zavalla	31·64

The records of the Inharrime are, unfortunately, incomplete, December being wanting. For the eleven months the fall was 31·64, compared with 26·92 at Zavalla, the next station southward, for the same period. The maximum fall in twenty-four hours was 4·80 inches at Villanculos on March 24th.

It would appear from this table that the northern part of the district, which is almost waterless, has a greater rainfall than the southern, where the rivers are and the bulk of the people live.

Lourenzo Marques.

In the "Delagoa Directory" for 1912 the statistics of the Swiss Mission House for 1910–11 are published, together with monthly averages for thirteen years, but the year is taken as ending October 31st, so the annual totals will not bear strict comparison with those of other stations which adopt the calendar year employed throughout the world. The average for thirteen years ending October 31, 1911, totals 27·51 inches. The rainfall at the Observatory in 1910 was 34·31 inches (reduced from millimetres), 11·27 inches falling in February.

Mozambique Company's Territory.

The readings for Mzimbiti, twenty-one miles west of Beira, kindly given me by Mr. R. H. B. Dickson, Assistant-Director of Agriculture, were 57·70 inches for 1910 and 16·40 inches for March, the wettest month of the year.

In the monsoon region, that is, from Cape Delgado approximately to Cape Guardafui, rainfall along the coast decreases as we proceed northward, that of German East Africa being greater than that of British East Africa; Italian Somaliland, beginning at the Equator, being almost rainless. An explanation of this

may be sought in the fact that the heavily charged atmosphere, moving northwards as the monsoon follows the retreating sun, precipitates its moisture copiously in the cool-lying southern latitudes, meeting fewer cooling currents as the heated northern regions are entered. From the foregoing tables it is seen that a corresponding generalization cannot be applied to the Mozambique coast, which is watered by easterly winds. We are without any complete records from the Nyassaland Company's territory, so are compelled to leave that out of account in the present survey. The most northerly district of which we treat, namely Mozambique, and the most southerly, Lourenzo Marques, have the lowest rainfalls, almost identical in quantity. The average for Mozambique Island for the five years 1901–5 was 26·04 inches, that of Lourenzo Marques for thirteen years 27·51 inches, a difference only 1·47 inches in favour of Lourenzo Marques, as far as these unequal periods go. Evidently latitude has no influence upon the quantity of rainfall in this Province, as it has in the region of the monsoon.

Quelimane, the garden of the coast, has the greatest rainfall, some of its readings being truly tropical. It is a land of rivers and mountains. Next in order, as far as the year 1910 is any guide,

comes Mzimbiti, and then, though some distance behind Quelimane, the northern part of Inhambane district. It is a waterless land far removed from mountains. The curve shows a sharp rise from Mozambique to Quelimane, a drop to the Zambezi, a rise again to Beira, and then a steady fall to Lourenzo Marques. The records for the Zambezi are disappointingly low. Judging by the increase as we descend the river, Chinde has a greater fall than Marromeu. This would accord with the view that the prevailing easterly winds precipitate their moisture rapidly as they meet the radiating currents of the land, the proportion left over for the interior decreasing in volume as the coast is left.

The rains in the southern part of the Province precede those in the northern by over a month, those of Lourenzo Marques and Inhambane usually beginning in October or November, of Quelimane and Mozambique in December and January. The Zambezi fits itself in midway by opening the season in November and December, with an occasional postponement to January. No such sequence, apparently, controls the termination of the rains. In Mozambique they come to an end in March and in Lourenzo Marques in February or March; in Inhambane, April; the Zambezi,

March or April ; and in Quelimane they are spread over six or seven months and are prolonged into June or July.

The distribution of rainfall in some of the districts is indicated by the following table of the average number of rainy days :—

	Rainy Days.
Lourenzo Marques, 13 years	68
Inhamusua (Inhambane), 1908–10 ...	51
Porto Bello (Quelimane) ,, ...	84
Brigodo ,, ,, ...	74
Maballa ,, ,, ...	74

The length of the dry season, an important factor when considering the suitability of a country for such products as, for example, cotton, tobacco, rubber, can be given for Inhamusua (Inhambane) only :—

	Days without Rain.
1907, July 22 to September 16 ...	56
1908 ,, 21 ,, 22 ...	66
1909 ,, 20 ,, 2 ...	44
1910 ,, 5 ,, 29 ...	86
1911 ,, 21 to August 26 ...	86

In addition to those gentlemen to whom I have already referred, I have to express my grateful acknowledgments to Captain Torres, Captaõ do Porto, Mozambique ; the staff of the Campanhia do Boror, Quelimane ; Mr. Nicol, Manager of the Bompona ; Mr. Charles Hornung, Dr. Bruce, and Dr. Swale of the Sena Sugar Estates, Limited.

CHAPTER XXIII

THE PRAZO SYSTEM

No account of Portuguese East Africa would be complete without a reference to the prazo system that is in vogue in the Quelimane and Tete districts; a system whereby the native tax is farmed out to individuals or companies for a fixed annual payment and an undertaking to do a certain amount of agricultural development. The underlying principle contemplates a payment to the Government of 50 per cent. of the estimated yield of the tax, which proportion the prazo holders are to collect from the natives; the labour of the people to be acquired instead of the other 50 per cent. Taking the whole district of Quelimane at a rough computation at 9,000,000 hectares, the area administered under the prazo system may be set down at 5,400,000 hectares; that under direct Government administration at 3,600,000 hectares: roughly in the proportion of 3 to 2.

The prazos have come in for a considerable amount of criticism, locking up, as they do, some of the richest and most accessible land in the Province. Theoretically any one is at liberty to peg out waste land within a prazo, but in practice no one ever does, because the prazo holder under the terms of his holding enjoys pre-emptive right of occupation over all land so pegged out. No sensible man will spend his time and money looking for a suitable piece of land on which to settle if, when he has found it, the prior claim belongs to some one else ; and no sensible prazo holder would let slip such an opportunity to acquire a good piece of land, the presumption being that the selected piece is particularly worth having or it would not have been selected.

A second objection is taken to the fact that in some cases the prazo companies do no agricultural development or very little, devoting all their energies to making what they can out of the native tax and recruiting. One or two prazo companies show commendable enterprise, but yet even in the case of the most progressive I estimate that only about 0·5 per cent. of the total holding is under cultivation. Want of capital is the reason given for this inactivity, but this should not be admitted as an excuse for an almost total neglect of cultivating enter-

prise, as exhibited in some cases. But the most serious evil to my mind is the control exercised over the labour supply in compelling the people to pay their tax in kind, to which I have referred in another chapter. I have estimated that it absorbs between 60,000 and 70,000 people. The new-comer with this tremendous competition to face would find himself at a most serious disadvantage. Indeed, under the present prazo system settlement of the land by white planters is an impossibility. There is another point which the practical planter would need to take into account. We see that the prazo holders have working for them directly on their plantations and indirectly in growing and bringing in the tax a very large number of people; as many people as the mines of South Africa take from the Province.

The resulting production of wealth, it may be remarked in passing, is insignificant. In addition they exercise judicial powers over the natives, so that their influence over them is absolute, and they could, by exercising it prejudicially against a new-comer, make it impossible for him to obtain labour. The instruments of their powers are local managers, who are sometimes also the Government agents; hence, in addition to having complete control of labour

and the power to ruin any planter by stopping his labour supplies, the local prazo manager, in a dispute, would be in the position of representing one of the interested parties and at the same time of being the arbiter.

But while drawing attention to the obstacles to development that exist under the prazo system it is necessary not to lose sight of the good that it has done. Quelimane is the most progressive district of the Province, and the progress that has been made there has been the work of the prazos. There is none in the Government reserves. Hence, whatever criticisms are brought against the system, the prazo holders can with fairness reply that, little as they themselves may perhaps have done, they have at least done more than any one else. It is up to the Government in their reserves to show the more excellent way. Impartial observers, too, will admit that much credit is due to the prazos for the success they have achieved in educating the natives in handicrafts. Every prazo station is an industrial workshop, wherein carpenters and furniture makers, blacksmiths, boatbuilders, and, sometimes, when there is any building going on, masons can be seen daily plying their trades without any particular supervision. No missionary station that I have ever

visited in East Africa could provide such an object-lesson in native industry and application as one of these large prazo stations, for example, Porto Bello. This is not only a proof of the high intelligence of the natives of the district, but reflects great credit on the prazo managers to whose patient instruction these results are due.

But when all is said, a system under which the richest district in the Province is practically the reserve of a few companies by no means wealthy, cultivating but a minute fraction of the land, is a system that cannot continue. It belongs to a back era and must go.

The whole of the left bank of the river from Mount Morrumbala to Chinde as well as the right bank as far as Sena, with the exception of about 20 miles at Chupanga, have been acquired by one prazo company. The island of Inhangoma is in the occupation of another. Hence practically all the rich sugar lands of the Chire and the Zambezi from Chilomo downwards are the reserves of two companies, and though the natural resources of the rivers are rich and extensive, it would seem as if they are likely to remain locked up, save for the comparatively small operations of these companies.

That portion of the district of Quelimane administered directly by the Government con-

sists of the circumscriptions of Maganja da Costa, Alto Moluco, and Baixo Moluco. In these reserves there is no development going on by private companies or individuals: a somewhat surprising circumstance, considering the natural advantages. I can find no explanation for this except that for all practical purposes these reserves are Government prazos.

CHAPTER XXIV

NATIVES AND LABOUR IN TROPICAL EAST AFRICA

One of the limiting factors to the development of agriculture in East Africa is the difficulty of procuring labour ; a difficulty which arises from three causes: a sparse population, indolent disposition of the people, inexperience of white employers.

The density of population in the three Protectorates of Great Britain, Germany, and Portugal is probably between 20 and 30 to the square mile ; that of the United Kingdom is 350, India 166. These figures bring out the absolute deficiency of people, a fact often overlooked by planters, whose complaint usually is that the natives do not want to work, and that when they are persuaded to accept service they are lazy and indolent.

Africans, taking them as a whole, dislike regular work, and I must confess that I do not find fault with them for that. They did not ask the

European to come to their country; his money and machines are not necessities for them, and they would be well enough pleased, indeed, if he packed up his things and took his departure. It is a point of view with which I can sympathize. It does not entitle natives to ownership of land other than that they occupy, but they are, I think, justified in pleading that while they cannot prevent the Europeans appropriating waste land they should make their own arrangements about working that land without interfering with their liberties.

The indolence of natives is another source of exasperation to the employer of labour; exasperation leading to irritability and irritability to illness; but I am persuaded that if the employer could but see in the laziness of natives not a crime but a providential phase of constitution, much disappointment and useless irritation would be spared him. Wise in all she does, Nature in equipping Africans with an indolent and languid disposition did so for their protection. Had they not been indolent they would, we may well believe, have been unable to survive the enervating climate of the Tropics, where a race possessed of the energy of Europeans could not perform manual labour in the field regularly. Through their laziness

they have lived and are able to endure field labour under the tropic sun.

When we go big-game shooting in Africa we prepare ourselves by studying, in the literature of the subject, in which most European languages are rich, the habits and behaviour of the game we are going to hunt, but we do not take the same pains with the labour we are going to employ. Under the modern system of high cultivation, involving the elaborate study of the plant, the soil and the climate, we have overlooked the fact that in the Tropics there is another element to study of which the laboratory can tell us nothing. Hence the intending planter has few facilities for acquainting himself with the characteristics of the people whom he will be compelled to employ. He goes with his European system based upon a definite amount of work for a definite amount of pay, requiring every man to sweat his sixty minutes to the hour. The ability to understand and manage natives is very largely a matter of temperament, some men being constitutionally incapable of appreciating the native point of view, interpreting as intentional offences or negligence what may be merely the natural expression of a happy, irresponsible disposition providentially bestowed. Such men will never succeed in Africa and should not go there. But most men

come in time to accept to some extent the limitations of the natives; though at the expense of permanent injury to temper, and in the belief that they are the victims of injury and injustice on the part of a malingering, ungrateful people.

The mariner who encounters contrary winds and currents in the sea he sets out to navigate would be considered unreasonable if he complained about them; but the temperament of the African is no less a force of nature to be studied and prepared for than monsoons and tides. The African is what he is and what Nature has made him; and it is as much our duty to study him as to study the soil and climate. If we cannot do this before we go to Africa we can at least make up our minds to make him the subject of unprejudiced investigation when we get there; sparing ourselves the expenditure of much precious nervous force and the native much abuse.

Recent events in England have shown that it is by no means certain that the system of working for fixed wages has been finally accepted as the only system under which employer and employed, even in civilized countries, can co-operate. And yet we come into Africa and expect the natives, who never heard of such a system till we entered their country, to understand the obligations it

entails, and proceed to denounce them if they don't live up to it. The manner in which the clove industry of Zanzibar was built up and worked is an object-lesson to East Africa. It has been the work of Arabs, who in their ability to control and influence natives have surpassed all the ruling races that have succeeded one another in East Africa. It is true they imposed upon the people a system of slavery which the moral conscience of the world condemned, but that does not affect the fact that they had a wonderful power of making natives work and work contentedly. During the whole period of their domination of the coast there is no record of a native rising. There were rebellions led by ambitious chiefs bidding for power, but there were no risings by natives incited by real or imaginary grievances or oppressive government; a record that no European Power can show.

The Arab never set a task; he may have had one on the rota but he never insisted upon it. His labourers went out to pick cloves, and some brought in five measures and some fifteen; but all received a like recompense in money, food, and clothing. Lord Cromer, quoting Sir Alfred Lyall, said, "Accuracy is abhorrent to the Oriental mind. Every Anglo-Indian official should always remember that maxim." Our system, based upon a

definite amount of work for a definite amount of pay, may appear to the native a system of injustice, and not without reason; for this system ignores altogether the fact that both physically and mentally we have been endowed unequally by Nature. In Europe we know all about a man; how he works in the field, how he behaves himself in the village; but in Africa we know only half of him, as into the village life we cannot penetrate. A man may have virtues and be highly esteemed by his fellows and yet be an indifferent worker in the field. By judging of the number of square yards he can weed in a day, and measuring his worth by a system of tallies and checks, we may excite the resentment of his fellows. The Arab was content to get his cloves picked, leaving it more or less to the people themselves who should pick them from day to day. His guiding maxim with his people was tolerance, echoing the ways of natives themselves. No one who has even watched natives at work among themselves can fail to have been struck by the apparent inequality of the distribution of labour and the philosophic resignation with which such is always accepted, suggestive of an understanding between them; of which, however, they are always completely silent. A skilful and experienced European labourer is apt to cherish a sense of injustice if he receives

but the same wage as a weaker brother who cannot shovel so many tons of gravel as he can, or lay so many bricks. But with East Africans the reverse is the case, and you cannot please a gang of labourers more than by overlooking individual shortcomings.

The European system has come to stay now; the native himself would tolerate no other; but we should yet remember that all races of the world have been cradled under the patriarchal system and that the African is still in his cradle.

The native's predilection for intoxicants is also the subject of complaint amongst employers and also officials. It is generally considered to be evidence of the degenerating influence of contact with civilization. If not that, then it is a vice which if not checked will lead the native on to destruction. In the cocoanut belt it is palm wine, further south cashew and cane. In Mozambique generally it is the Portuguese wine, in Nigeria gin. There are, of course, a hundred things from which the native ferments his beer or distils his alcohol. Visitors occasionally arrive at Delagoa Bay, spend a couple of days in the town, and then shriek out in the papers that the Portuguese are demoralizing the natives through selling their cheap wines to them.

Is it not possible that when Nature in bestowing upon the natives of Africa an appetite for fermented liquors and making the earth bring forth abundantly of fruits that they can ferment and drink she did so in her wisdom? I am not sure that we are wiser than Dame Nature when we legislate to try and stop natives drinking—which we shall never do—or denounce them as sunk in depravity—which is not the case. For thousands of years before we ever came on the scene natives have been fermenting wines and distilling spirit; of that we may be quite certain. Every African traveller who has left the main paths of European occupation must have met with evidence of this. Mr. Walter Goodfellow, leader of the British Ornithological Expedition to Dutch New Guinea, in a communication to the *Times* (March, 1911) stated that the natives of the coast, who were "quite unacquainted with white men," get fearfully intoxicated with a fermented drink they make out of a species of sugar palm, wild orgies taking place leading on to fights which lasted two days at a time. I feel sure that if we could but know the truth the advent of white men has had the effect of checking native indulgence for drink, not of encouraging it.

I am not excusing drunkenness; I certainly believe that indulgence in some of their whole-

some beverages at reasonable times is good for natives; I only plead that in this, as in all other things connected with the African, we should endeavour to understand the circumstances—so far as our limited understanding will permit us; for there is a gulf we can never cross—before forming own judgments.

An agreement exists between the Transvaal and Mozambique under which the former for certain equivalents is permitted to recruit natives in Portuguese East Africa for the Witwatersrand mines. This privilege is taken up from time to time and made the subject of denunciation in the Press by patriotic Portuguese, who write with very little experience of the subject, or by journalists hard up for copy. It is a popular rod with which to beat the Government. Recruiting is condemned because, it is said, the men who are sent to the Rand are required for the country; agricultural development being retarded by this drain on the labour resources, and also because of the mortality on the mines.

The number of natives received by the Witwatersrand Native Labour Association from Portuguese East Africa during the year ending December 31st was 62,317, the number actually employed on the last day of that year being

93,069. In general terms we may say that 100,000 men from Portuguese East Africa are continually being employed on the Rand.

This figure represents a large drain upon the manhood and labour strength of the country. Employed in sugar plantations, these men would produce and manufacture 300,000 tons of sugar a year, worth, let us, five millions sterling.

When we come to examine into the local circumstances we find that the case cannot be so simply stated, and that as a matter of fact it is very doubtful whether the development of the country is being retarded to any serious extent through this recruiting. The circumstances of Inhambane may be taken as an example. Some 35,000 natives of that district are employed on the Rand out of a population of 500,000, that is, 7 per cent. Inhambane is at present the second most progressive district in the Province, but the total number of people in the permanent employ of planters is probably under 1,000. It is absurd to argue that a community that can employ but 0·2 per cent. of its population suffers because 7 per cent. seek employment in another country. It is stated that these men are the best in the land, and no doubt they are among the best, but women and children make good cultivators of the soil, and these do not go to the

Rand. It is also pointed out that they return from the mines with so much money that they despise the low pay the planter can offer. This argument loses much of its force by the example of the Mozambique Company's territory where recruiting is not permitted, but where labour is more difficult to obtain than at Inhambane and wages are the same. The principal effect of stopping recruiting in Inhambane would be, I think, to send the people back to their gardens, not to the plantations of the white settlers. Before recruiting began five hundred people daily thronged the market and streets of Inhambane bringing in hides, groundnuts, bees-wax, and other produce, but this traffic has now come to an end.

The chief complaint in the district of Lourenzo Marques, where as yet very little agricultural development is taking place, is that the mines keep up the price of wages at a high level; but this view is difficult to reconcile with the fact that in Inhambane, where approximately an equal number of men are annually recruited, wages are only half those in Lourenzo Marques. If recruiting is responsible for high wages in Lourenzo Marques, how is it that high wages do not prevail in Inhambane? We must seek, I think, for other causes; one bein the port, wages always being high in port towns. But the principal cause,

without doubt, are the rates, taxes, and licences imposed by the municipality which make living excessively dear, not only for the natives but for the European also. The influence of the town extends for a considerable distance into the country round, but it dwindles away and disappears at the Limpopo.

In the district of Mozambique no agricultural development exists ; hence no harm is being done to the agricultural progress of that region through the exodus of 8,000 people, which represents approximately the annual recruiting from there for the Rand. In the Mozambique Company's territory no recruiting is permitted, as has been stated ; in Tete and the Nyassaland Company's territory there is little or no agricultural development to hold back.

If this study of the circumstances be impartial and reasonable, which I believe it to be, there is found to be no case against recruiting in so far as the great part of the Province is concerned, and under existing conditions. A few years may upset the balance, but at present there is no case. It may, perhaps, add weight to my opinions if I state that on first arriving in the country I was inclined to join in the chorus of protest, my sympathies naturally being with the land, and that it was only after travelling through

the various districts and studying the conditions on the spot that I came to modify my views.

Quelimane, the most progressive of the districts, is yet to be considered and the circumstances there are complicated through the existence of the prazo system. The prazo companies control an enormous number of people, certainly over half a million; and though they employ on their plantations, including the sugar plantations of the Zambezi, under 15,000, they complain of shortage of labour. The prazo companies, as I have elsewhere explained, are, in the main, organizations for the exploitation of the natives; this exploitation taking the form of imposing upon them taxes to be paid in kind. The men and boys have to bring their loads long distances to the collecting stations. Receiving nothing for their produce, it being a tax, the journey is a hungry one both going and returning. The emaciated condition of the people one meets on the roads is evidence that this must be so. Calculating the men required to carry the produce collected for this tax, the days occupied in the double journey, the period for rest and recoupment afterwards, the labour absorbed cannot be less than the equivalent of 10,000 men daily throughout the year. This is unprofitable labour,

because it could be performed by transport animals. Going on to consider the labour employed in growing the produce, it is a moderate estimate that altogether between 60,000 and 70,000 are locked up with this tax. The prazo companies who complain of shortage of labour have an obvious remedy in their own hands.

But this, though it furnishes a sidelight upon the labour troubles of the district, scarcely touches perhaps the subject of recruiting. Recruiting for the mines is not permitted in the prazos, but it is in the Government reserves in the east of the district and in Tete. In the year 1910 4,387 people were recruited from the district of Tete and 120 from Barue. They were taken down the Zambezi, past the very doors of the sugar plantations upon which there is a shortage of labour to the extent of some 3,000 men. The opening up of another factory that could find employment for several thousand more is being held over solely on account of the uncertainty of being able to obtain labour. In the Government reserves 2,529 went to the Rand the same year. Here then we find on the one hand agricultural development being actually held back for want of labour, and on the other 7,000 men taken away to develop the resources of another country. There is thus, I think, a

very strong case against allowing recruiting in the Tete or Quelimane districts, no matter what qualifying circumstances are pleaded. Expansion on the Zambezi is being checked for want of labour, therefore the labour resources of that region should not be exploited for other countries.

I do not propose to enter into any discussion on the subject of mortality on the mines as it is one which I have had no facilities of studying. But I think this mortality, which is excessive chiefly among natives recruited from the tropical districts, would be considerably reduced if the reopening of the recruiting reason were postponed and no natives from the tropics permitted to enter the Transvaal till mild weather had set in, say the month of October.

CHAPTER XXV

SECURITY OF TENURE—THE FISCAL SYSTEM

The Portuguese tell you that they can conquer but cannot colonize, so Portuguese East Africa is being developed mainly by British capital. But capital is a shy courtier, and while neighbouring British States attract large numbers of settlers yearly, Mozambique is avoided, and save for a few specks the whole of the immense territory lies fallow. One reason for this is the belief that security of tenure cannot be depended upon, and this belief gained in credence after the revolution of October, 1910, owing to the difficulty certain British concessioners experienced in obtaining their title-deeds. Encouraged by clamorous agitators of the town of Lourenzo Marques, who congregate in the canteens and mislead people into thinking they represent the political thought of the Province (the fact being

that outside this town there is no politics at all) certain foolish people publicly proclaimed a new doctrine, setting forth that the laws of the land while binding upon the people did not bind the Government, who was above them, and when it pleased them to do so could arbitrarily decline to fulfil their legal obligations under them. This caused considerable uneasiness at the time, though people who knew the Portuguese never felt any real anxiety on the matter; there being no more honourable people where questions of law are concerned than they.

There are two classes of concessioners, with one of which I have no sympathy. The man who wishes to peg out a piece of land for sugar planting, grazing, fruit-farming or any definite enterprise is a man to welcome and encourage; but there is another class whose desire is to get the word concession on to a document, and whose intention is to exploit the document, not the land, which probably has never been visited. In their desire to exclude such as these, be they Portuguese or "foreign," the Government should command the support of all right-thinking people.

The Portuguese Government are aware that it is a dangerous policy to allow the Province to continue in the condition of undevelopment

in which it now exists, and any one who wishes to take up land with the *bona-fide* object of engaging in agriculture need fear no official obstruction. If in preparing his deeds he has complied with the law, his tenure will be as secure as in any other country. The laws being a little complicated, as land laws often are, he will be wise in placing himself in the hands of a Portuguese lawyer of repute to keep him in the legal way. If he neglects to do this let him not complain afterwards if he loses his legal way and his land with it.

Yet it cannot be denied that there is something the matter with Portuguese East Africa; not with the land but with some of the laws; the customs tariff among them. What a blessing Europe would confer upon Africa if she refrained from imposing upon that infant continent, which she is now cradling, the customs curse under which she herself is shackled, and which leads to such calamities as the Douglas case. If the European countries agreed that customs dues should be levied at the coast only, and that once past the maritime frontier commodities should be subjected to no further impositions but be permitted to circulate freely within the continent, tariffs could be so adjusted that very little revenue would be lost, while a great saving could be effected in the

upkeep of outposts, and the most potent source of friction and dispute abolished for ever. Will not some of our great societies take the matter up and combine to bring to Africa this inestimable boon ?

Mozambique is entangled in a web of tariffs from which even the resident who does not leave the country can never extricate himself. Embarking in a coasting boat and proceeding to Inhambane, Chinde, or any other port in the territory, he is treated like a traveller from a foreign country ? If he crosses from one side of the Zambezi to the other he is held up by a customs official ; if he recrosses next morning he is stopped by another. He has probably nothing but Portuguese wines with him and provisions bought in the country ; it matters not, as things conveyed from one administrative centre to another are subject to duty. The presence of the Mozambique Company further complicates matters, and being expected to earn dividends it is compelled to ply its tariff loom with persistence.

It is this mesh of dues, licences, taxes, fees, and rates, that keeps capital away, and no one more laments the fact than the Portuguese themselves, who complain bitterly of these grinding wheels which go round and round but never

forward. One well-known and esteemed resident, who has held high office in the country and spent his time and his own money in endeavouring to develop her resources, is now after thirty years giving it up, driven out as he declares by the obstructing laws of his own country. He is typical of the majority of Portuguese, who would ardently welcome a strong revising hand secure of support from Lisbon to reconstruct the fiscal system. There are not wanting signs that their hopes will be fulfilled.

Monopolies constitute another barrier to progress. In some of the districts one person has the monopoly of selling firewood, another paraffin, another alcohol, another mineral waters. The prazo system is a monopoly over the best land in the country by a few companies whose capital is totally inadequate for their task. One prazo company controlling about four million acres of land has a capital of but £6,000. The system whereby planters are dependent upon the administrators for their labour supply amounts to a monopoly of labour by the Government. The French economist, Morellet, endorsed by Franklin and quoted by Lord Acton, wrote that he preferred liberty of trading, cultivating, manufacturing, &c., even to civil liberty, this being affected but rarely, the other every hour.

Man, indeed, not in Mozambique alone but in other African countries also, seems to begin by studying Nature's laws, then making laws of his own to render hers as fruitless as possible. Yet it is better this way than the other. Man's laws can be readjusted, but Nature when she lays her blighting touch upon a land is implacable. With Mozambique she has been bountiful and time is on her side.

The Portuguese view with some alarm the exploitation of the resources of the country by "foreigners"; miscalled so, because all Europeans, including the Portuguese themselves, are foreigners in the Province. This alarm leads the irresponsible portions of the community, generally, as in other countries, the noisiest, into hostile demonstrations which, however, never get beyond the columns of the local Press. It constitutes an unpleasant feature of life in the country, as Europeans other than Portuguese are made to feel that they are regarded as guests, that is to say intruders, and no one likes to be continually reminded by his neighbours that his presence is objectionable to them.

Nevertheless it is a point of view with which we can sympathize. Portugal, proud of her historic past, yet knowing that she has not the strength to develop her territory unaided, watches with

apprehension the progressive forces with which she is enveloped in Natal, the Transvaal, Rhodesia, and Nyassaland; remembering Johannesburg, where they witnessed a small struggling people succumb to the pressure of capital. With that object-lesson before them they cannot be blamed for scenting danger in "foreign" capital. But the warning of Johannesburg should be rightly interpreted; only in misinterpretation does danger lie.

One of the wisest messages ever sent to a young country was that by President Roosevelt, when he warned Australia against the danger of keeping her north unpeopled and undeveloped. Just as Nature abhors a vacuum, so the progressive races will not tolerate fertile tracts of the earth being left undeveloped. If the Boer flag had stood for equal rights for all it would have waved at Pretoria to-day, and Paul Kruger and his successors would have continued to rule over a country destined to grow into a mighty nation. But it symbolized race prejudice and was hauled down.

When British people leave their native shores for colonies and young countries, they identify themselves with the interests of those young countries, support their institutions and oppose interference from outside, even from their own mother-land. The cries: "Australia for the

Australians," "Canada for the Canadians," have become household expressions. They mean the closing up of all ranks, irrespective of country of origin, to fight the battles of the country of adoption. The vigour and vitality of the country will increase in proportion as the population of the progressive races increases, and with progress and population independence becomes more secure. That is the true lesson for Mozambique. Her interest is to welcome all, as many as will come, no matter where from, so long as they have money to lay out in developing the resources of the land; that they may grow into loyal supporters of the Government, jealous of the liberties and privileges of their adopted country.

APPENDICES

APPENDIX I

NOTES ON CEARA RUBBER IN EAST AFRICA

These notes are intended for nothing more than what they are, namely, notes. They apply chiefly to the experience of German East Africa, but with a new industry, practice varies with every plantation and changes rapidly from year to year. Still these notes may furnish planters in Mozambique with some useful data to begin upon.

Number of trees tapped per day per man: Anything from 50 to 400, according to the age and thickness of bark.

Number of times trees can be tapped per month and year: 2 to 3 and even 4 days running, according to age of tree, then 15 to 20 days' rest; repeat throughout year while leaves are on the tree. Do not tap trees when the leaves are off.

Pruning: Only done when trees are top-heavy. If very long and thin, trees may be topped just before rains. Drooping trees are generally good producers.

Distance apart: In rich soil 12 by 12, otherwise 10 by 10 feet.

Age of trees when they stop giving latex: Not known; some say 17 to 20 years, others much less. They sometimes die, especially if attacked by white ants, at 7 or 8 years.

Cost per acre to plant and cultivate to 3 years old: If properly managed and economically worked this should not be more than £14 per acre, including clearing the land.

Value of full bearing plantations, say over 3 years old: 1s. or 1s. 4d. (1 rupee) per tree in good land.

Average yield per tree: Varies; 6 oz. per tree; 3 to 5 trees to 1 lb. of dry rubber; from 50 to 90 lb. of dry rubber per acre.

Task of men tapping: This depends on the age of the trees, and varies in different plantations from ¾ lb. to 2 lb. per day.

Task of one man hoeing: 800 to 1,000 square yards *per diem*.

Coagulants: If limes are procurable in large quantities and cheap, say 10 to 20 cents per cwt., they are the best and cheapest coagulant.

Dr. Zimmermann's mixture:—

	Per Cent.
2¼ litres carbolic acid	0·04
1½ litre acetic acid	0·25
600 litres water	99·71
	100·00

Cost of production of dry rubber at estate should not exceed from 1s. 6d. to 2s. per lb., including every expense.

Tapping trees to death: Not possible with the stabbing method if properly performed.

Seed from old trees is better than seed from young.

1,400 seeds in 1 kilo, 50 kilos in 1 bag. 50 rupees a bag.

Good seed should germinate 80 to 90 per cent.

How many men per acre should be kept? One man for 2 acres is fair average; when plantation is producing, nearly all these men will be tapping except in dry months, when only the best tappers are kept at it, the remainder hoeing.

Planting leguminous crops for manure: Not done, but certainly should be tried.

Size of trees ready to tap: Anything above 25 centimetres in circumference; very often smaller trees are tapped if over 2½ years old.

Knives: Almost any knife will do. The commonest knives used in German East Africa are called "Superior Butcher," 3s. per dozen, others 4s. They last about three months. Points of knives should be rounded.

Loss of weight in drying: Up to 50 per cent., sometimes not more than 25 per cent.; with young trees under 6 years scarcely ever under 40 per cent.

Peeling off the bark before tapping: This, if practised, should be done about three weeks before the trees are tapped, and be done only once per annum; one man will peel 10 to 25 trees *per diem.*

APPENDIX II

THE LAND LAW

FOR THE PROVINCE OF MOZAMBIQUE

ENGLISH TRANSLATION

The following translation into English of the new Portuguese Colonial Land Law, approved by Decree of July 9, 1909, applies to the Province of Mozambique, and is published as a special supplement to the *Boletim Official* dated September 2, 1909.

CHAPTER I

Ownership of the State.

Art. 1.—In the Province of Mozambique all immovable property which at the time of the promulgation of this law is not owned by any individual person or collective body belongs to the State.

CHAPTER II

Classification of Lands.

Art. 2.—Lands which are the property of the State are classified in two groups, viz. :—

(a) That of lands in classified townships, or destined for the establishment of such townships and their suburbs;

(b) That of lands not comprised in the first group.

Art. 3.—There are three classes of townships, and as such shall only be considered those places having a European population, provided those situated in the neighbourhood of others of greater importance be excepted, they falling under the classification of suburban townships.

Classification of Existing Townships.

Art. 4.—The classification of existing townships is as specified in the schedule annexed hereto.

(1) Their area and that of their respective suburbs shall be beaconed off by the Survey Department, by means of stone beacons to be erected on the occasion of the making of the survey in connection with the drawing up of the plans of such townships.

(2) The suburbs referred to shall comprise, whenever possible, a belt of land around the township 4 or 5 kilometres wide in the case of first-class townships, 3 or 4 in the case of second-class townships, and 2 or 3 in the case of third-class townships. The outer boundaries of such suburbs shall as nearly as possible run parallel with the boundaries of such townships.

Limitation of Lourenzo Marques.

(3) This sub-section defines the limits of the town of Lourenzo Marques.

New Townships—Area reserved therefor.

Art. 5.—In future when a new township is established its centre shall be described with all possible exactness in the proclamation relating thereto.

(1) The area reserved for such townships shall be that comprised in a circumference with a radius of 3 kilometres from the point selected as centre.

(2) The suburban area shall comprise the land between the boundary line of such circumference and another with a radius of 5 kilometres from the common centre.

(3) The centre of any new township may be fixed within the suburban area of a township already in existence, but in this case no suburb shall be allotted to the new township thus established.

LAYING OUT OF NEW TOWNSHIPS.

Articles 6, 7, and 8, and their Sub-Sections, deal with the creation and laying out of new townships, the establishment of which lies with the Governor-General in consultation with the Government Council.

Art. 9.—Survey plans of townships and suburbs shall be always available for inspection by the public. Such plans shall show the stands, duly numbered, those reserved to the State as well as those which may be granted.

Articles 10 and 11 deal with the classification of townships.

CHAPTER III

IMMOVABLE PROPERTY WHICH CANNOT BE GRANTED.

Art. 12.—Concessions shall not be granted by the State in the following cases :—

(1) That of urban property and adjoining lands regarded as indispensable for the purpose of the public services;

(2) That of islands, islets, and mud-banks formed near the sea-coast, or at the mouth of any rivers, and in the beds of any navigable or floating stream;

(3) That of land situated on the sea-coast or along the beach of any bay or estuary within a zone of 80 metres inland reckoned from the point reached by the highest tide;

(4) That of lands comprised within a zone varying between 5 and 20 metres on the banks of any navigable or floating stream, each zone being reckoned from the edge of the ordinary bed of such stream. The same reservation applies in the case of banks of lakes and lagoons when such cover an extent of more than 1 kilometre. The width of such zone is to be fixed by the Governor-General in Government Council assembled, attention being paid to the importance of any such streams, lakes or lagoons from a commercial point of view.

(5) That of lands situated within 100 metres of a railway-line, already built or projected.

(6) That of lands reserved by the Central Government or by the Government of the Province, and as such declared in the *Boletim Official*, provided this shall hold

good whilst such lands maintain this classification and no longer.

(7) That of roadways giving access to any property belonging to the State, and as such indispensable.

Sub-section 1.—"Navigable stream" means a stream which during the year or during its greater part can be navigated for commercial purposes by vessels of any shape, construction or dimensions; "floating stream" means a stream which during the year or its greater part may be utilized for the transportation of floating objects.

Sub-section 2.—In cases where only a portion of a stream comes within the meaning of "navigable" or "floating," to each such portion alone shall such classification be applied.

Sub-section 3.—Preceding the approval of the Government Council, the Governor-General may declare to be the private property of the State any of those things specified above.

CHAPTER IV

Concessions to Natives.

Art. 13.—The Central Government or the Governor-General may reserve exclusively for natives certain areas of land.

Sub-section.—Within such areas the said natives are allowed to occupy any section thereof, but such occupation shall never be held to confer on such natives rights of ownership.

Art. 14.—Every native is likewise allowed to occupy only provisionally outside the areas referred to in the last preceding article any lands which may be vacant and uncultivated and whose boundaries have not been defined, provided such lands be outside the areas of the classified townships and do not fall under the exceptions of Article 12.

Art. 15.—In order that the occupation referred to in the last preceding article may become legitimate the following conditions must be complied with :—

(1) Title of occupation must be obtained ;

(2) Occupation to be shown by residence and by the cultivation of the usual native crops ;

(3) The land thus occupied must not comprise an area of more than 2 hectares in respect of each adult member of the family of the native concerned, such family comprising, besides the head himself, only the wives, children under age, and invalid parents.

(4) Such land must have and maintain its boundaries defined.

Titled Occupation.

Sub-section 1.—Titled occupation is that based on the document referred to in Article 29.

Sub-section 2.—The area mentioned in No. 3 above may, in accordance with the number of persons comprising the native's family, be increased or diminished from time to time by the Administradores de Concelho, Administradores de Circumscripcoes Civis, or Capitaes-Mores; in the case of the number of such family being reduced the original area may be maintained if the head of the family request it and be in a position to cultivate such ground.

Complete Ownership of Land Occupied.

Art. 16.—Occupation, in terms of the last preceding Article, lasting for a period of 20 consecutive years from the date of granting of title, and provided a third at least of the ground be under cultivation and the conditions laid down in Article 30 (4) be observed, shall give the occupier complete ownership of the land thus occupied.

Art. 17.—Until the period prescribed in the last preceding Article has elapsed, it is expressly forbidden to such native occupier to have recourse to the mode of justification of ownership referred to in Article 595 of the Civil Code, and likewise to alienate, exchange, mortgage or lease the ground thus occupied; such land cannot even be attached or seized under legal warrant.

Sub-section.—Any contract entered into by natives in contravention of the terms of this Article shall be null and void. The Registrars of Deeds shall refuse to register any titles embodying such contracts, and the notary responsible for the drawing up of the said contracts shall become subject to dismissal, the parties who suffer loss or damage retaining, notwithstanding such dismissal, the right to claim from such notary an indemnity for any loss or damage sustained.

Art. 18.—Any native absenting himself together with all his family or ceasing to cultivate the ground in his occupation for more than one whole year shall lose the right to continue to occupy the same, such land therefore being considered free.

Sub-section.—In all cases of absence for periods of more than 90 days notifica-

tion of such absence shall be made by the native concerned to the respective Administrador de Concelho, Administrador de Circumscripcao or Capitao-Mor, failing which he shall be liable to the penalty prescribed in Article 35, No. 5.

Art. 19.—On the death of a native the land in his possession under the title of occupancy, but which has been occupied for less than 20 years, is transferable with all rights acquired to his heirs, should they wish to cultivate same and reside thereon, the native usages, or the relative code law when such exists, being observed in the matter of succession.

Sub-section.—In the case of the non-existence of heirs or when they exist but do not wish to cultivate the lands and reside thereon, such lands shall be considered free.

Art. 20.—Lands in the occupation of natives in terms of Article 15 for a period of less than 20 years, and those occupied by them without any title, when comprised in an area applied for under any of the forms prescribed for concessions, not being a free concession, can only be included in the grant, provided:

(1) Authority thereto be obtained from the Governor-General;

(2) Payment be made to the native to the amount of the value of any improvements made thereon.

Compensation to Native Occupiers.

Art. 21.—The compensation to be paid in terms of Sub-section 2 of the last preceding Article shall be fixed by the Governor-General, and shall be based on the number of huts and the value of the ground under cultivation.

Payments to Natives.

Sub-section 1.—The concession shall be declared null and void in case the amount of compensation is not deposited with the Treasury, and, this amount having been deposited, the documents in connection with the concession shall not be deemed to have been completed till proof is attached thereto showing that such amount has been paid over to the native or natives concerned.

Sub-sections 2 and 3 deal with the procedure to be followed by the Survey Department in making payment of these amounts to such natives.

Art. 22.—For purposes of the two last preceding Articles lands occupied by natives and

which at the time of the publication of the present law comply with the conditions prescribed in Article 24 shall be regarded, during the currency of one year, or during any further period for which an extension may be granted in terms of Sub-section 3 of the said Article, as being held under titled occupancy.

Art. 23.—If it become necessary, in order to carry out works of public utility, to order the evacuation of any land then in the occupation of natives in terms of Article 15, such natives shall receive compensation for any betterment made thereon, either in cash or in available vacant lands of a corresponding value, and in the occupation of the ground newly allotted account shall, for purposes of Article 16, be taken of the period of occupation of the lands vacated.

Condition of granting Titles for Land held by Natives before the Publication of the Present Law.

Art. 24.—In order that occupation may be guaranteed to natives in respect of lands which they may be occupying at the time of the publication of the present law, it is indispensable that within two years from the said date such natives make application in writing or verbally

for the requisite title to the respective Administrador de Concelho, Administrador de Circumscripcoes Civis, or Capitao-Mor.

Sub-section 1.—This title can only be granted on condition:—

(1) That the lands are not comprised in the exceptions mentioned in Article 12;

(2) That occupation has been held by the applicant in his own name and during at least a period of two years prior to the date of this law;

(3) That occupation is proved by the existence of buildings or land under cultivation;

(4) That the ground does not comprise more than 400 square metres within a classified township, or exceed the limit prescribed in Sub-section 3 of Article 15 when such lands are of the second class or are situated within the suburbs of a classified township;

(5) That there is no opposition of a third party.

Sub-section 2.—In case the areas occupied exceed the limit of Sub-section 1 (4) last preceding and the request for title of occupancy be in circumstances of being granted, the said areas shall be reduced to the prescribed limit, unless such limi-

tation should result in serious loss to the occupiers, in which case the Governor-General may authorize such occupiers to retain the ground thus in excess.

Sub-section 3.—In case there exist weighty reasons for so doing the Governor-General may extend, to be operative in the whole Province or in part thereof, the period of one year prescribed in Article 22.

Sub-section 4.—If the areas referred to in Sub-section 1 (4) of the present article be comprised within the areas specified in Sub-section 3 of Article 53, and, as regards their occupation, the conditions of such Sub-section 1 be fulfilled such lands may be expropriated and the occupiers granted ground elsewhere of a corresponding value.

Property Tax in Respect of Native Ownership.

Art. 25.—Natives occupying lands in a legitimate manner, *i.e.*, in accordance with the provisions of Articles 15 and 24, shall be exempt from the payment of the Property Tax in respect of such ground.

Sub-section.—This tax shall only be due after a native has obtained full ownership rights to the land occupied by him.

Native Exemption from Compulsory Service.

Art. 26.—Natives who may have acquired full ownership rights to the lands held by them in a legitimate manner shall be exempted :—

(1) From compulsory service with the police and military forces ;

(2) From compulsory labour ;

(3) From being called upon by the authorities to serve as sailors, boatmen or carriers.

Sub-section.—Such natives shall not, however, be exempt from accompanying their chiefs or indunas in the course of any military operations which may be carried out by order of the proper authorities.

Art. 27.—The following have power to grant to natives in terms of this chapter any lands not being those falling under the exceptions prescribed in Article 12, viz., the Administradores de Concelhos, Administradores de Circumscripcoes Civis, and Capitaes-Mores, it being, however, necessary that such concessions be confirmed by the Secretary for Native Affairs.

Articles 28 and 29 and their Sub-sections deal with the application to be made by natives in respect of such concessions and the procedure to be followed by the above-mentioned officials in granting them.

Titles of Occupation.

Art. 30.—The Administradores de Concelhos, Administradores de Circumscripcoes Civis, and Capitaes-Mores are likewise empowered to grant titles of occupation, as provided for in Article 24, the validity of such titles being also dependent on their being confirmed by the Secretary for Native Affairs.

Sub-sections 1, 2 and 3 prescribe the procedure to be followed in granting such titles.

Sub-section 4.—Though it may be alleged or shown that occupation has been held for a period of more than 20 years, such occupation shall never entitle a native to complete ownership of the lands thus occupied until at least five years have elapsed after the granting of the title of occupation and it be shown that during that period the conditions laid down in Articles 16 and 24 have been fulfilled.

Sub-section 5.—In accordance with the provisions of the last preceding Sub-section it is forbidden to natives coming under the operation of this Article to apply for justification of ownership as provided for in Article 595 of the Civil Code.

Article 31 and its Sub-sections deal with the registration of original titles granted to natives. This registration is to be made both in the local Administrative Offices and at the Head Offices of the Secretary for Native Affairs and the Surveyor-General.

Art. 32.—The Survey Department shall in accordance with the usual technical principles prepare a terrier of the lands granted under the provisions of the preceding Articles.

Titles of Complete Ownership.

Art. 33.—Titles of complete ownership can only be granted on an order from the Governor-General, the provisions of the next succeeding Articles being complied with.

Art. 34.—Any native who wishes to obtain title of complete ownership to the land he occupies, and is in a position to prove his occupation thereof, must himself make or through a duly authorized agent an application addressed to the Governor-General, to which the following documents shall be attached; (a) certificates testifying to the identity of such applicant and to the continued occupation by him of the land concerned; both documents to be issued by the respective Administradores de Concelhos, Administradores de Circumscripcoes Civis, and Capitaes-Mores;

(b) provisional title previously granted to such native in terms of Article 30 or 31; (c) acknowledgment of deposit made with the Treasury in respect of the cost of the title to be issued and of its registration at the Office of the Registrar of Deeds.

Sub-sections 1 to 5 deal with the procedure to be followed in the preparation of such titles.

Art. 35.—It is incumbent upon the Administradores de Concelhos, Administradores de Circumscripcoes, or Capitaes-Mores:

(1) To make known clearly to the natives without delay the provisions of Article 25;

(2) To induce the natives to take advantage of the privileges granted in this Chapter, by making widely known to them, through the Chiefs and other Native Authorities, all the provisions contained therein;

(3) To protect the natives against any attempt to deprive them of their rights of occupation;

(4) To inspect the manner in which the said natives fulfil the obligations prescribed for them in this Chapter;

(5) To ensure by all means at their command that the natural or artificial marks defining the boundaries of the different hold-

ings be maintained such officials being empowered to hold a trial and impose on those occupiers who shall have destroyed such marks or not maintained them fines up to 5,000 reis or even up to 10,000 reis in case of a subsequent offence;

(6) To draw up annually a detailed report of all matters connected with concessions granted in terms of this Chapter, such report to be sent to the Secretary for Native Affairs through the respective District Governor.

Sub-sections 1, 2, 3, 4 and 5 of this Article deal with the procedure to be followed in holding the trial referred to in No. (5) above and with the payment of the fines imposed, failing which the native will be compelled to render service which is to be reckoned for purposes of paying off the fine at the rate current locally. In no case, however, is such service to be for a term exceeding 60 days.

Art. 36.—The officials mentioned in the last preceding Article are expressly debarred on penalty of dismissal from receiving from natives any consideration in money, kind or even labour in connection with the granting of concessions in terms of this Chapter.

Sub-section.—All proceedings and documents respecting these concessions shall be free of charge, save the expenses referred to in the Sub-section of Article 28 (the marking of the boundary lines with stone beacons) and the cost of title of complete ownership and its registration at the Office of the Registrar of Deeds.

Definition of "Native" for Purposes of this Law.

Art. 37.—For purposes of this Chapter a native is an individual of colour, born in the Province and therein resident, who by his moral and intellectual development is not distinguishable from the bulk of his race.

CHAPTER V

PART I

Concessions of Land, Contracts, Quitrents, Leaseholds and Sales.

Art. 38.—Complete or temporary transference of lands from the State may in terms of the present law be made by means of contract of quitrent holding, of leasehold, and of sale.

Sub-section.—The provisions of Chapters IV. and IX. are excepted.

Art. 39.—Any lands granted by concession within the boundaries of any classified township can only be used for buildings, gardens, parks or sports grounds.

Mineral Rights Reserved.

Art. 40.—In all concessions of lands all rights to minerals or mineral springs shall always be reserved to the State, notwithstanding that no mention of such reservation be expressly made in the relative title.

Sub-section.—The exploitation and cutting of forests or any useful indigenous plants already existing on the ground as well as the exploitation of quarries and the utilization of water may only be carried out in accordance with the special regulations relating thereto.

Trees serving as Boundary Marks to be maintained.

Art. 41.—Except with the knowledge and consent of the Surveyor-General or the District Survey Officers, concessionaires or their representatives shall not under whatever pretext cut down or destroy any tree serving as a boundary mark of

their holdings, and further it is incumbent upon them to maintain in good condition the marks defining the peripheric vertexes, as shown on the diagram appertaining to the title of concession.

Fines for Non-observance.

Sub-section 1.—Non-observance of the provisions of this Article shall be punished with a fine not exceeding 50,000 reis in respect of each tree or mark destroyed wholly or in part, this being irrespective of the payment due for expenses incurred in the erection of marks, to be carried out by the Survey Department or the respective district office, in place of the marks and even trees destroyed.

Sub-section 2.—In case of subsequent infractions such fine may be increased up to 100,000 reis, but in no case shall the total amount exceed 2,000,000 reis.

Sub-section 3.—Such concessionaires or their representatives may only be exempted from the payment of the fines prescribed in the preceding Sub-sections in the event of their being able to prove that the persons guilty of such offences were not connected with their holding.

Sub-section 4.—The Surveyor-General, his district delegates, Administradores de Concelhos, Administradores de Circumscripoes Civis, and Capitaes-Mores shall have power to draw up and order the serving of writs in connection with such fines.

Sub-section 5.—Such writs shall be sworn to and shall hold good in a court of law till the contrary has been proved.

The action is to be brought forward by, and the fine imposed, at the instance of the Crown.

Sub-section 6.—The amount of such fine shall be paid into the Public Treasury, with the exception of one-tenth, which shall belong to the informer.

Sub-section 7.—While the matter is *sub judice* and before the trial is held the accused may make a confession of guilt and request the Court to fix a fine, which shall, together with the respective costs of the action, be paid within ten days of the date of the order of the Court, failing which the action shall be proceeded with in the ordinary way.

In the case of the action being proceeded with the Court may in giving final judgment alter the amount of the fine determined in the order previously issued.

Art. 42.—Persons holding concessions of lands shall maintain the servitudes existing thereon and as such shown on the relative plans and other documents in connection with such grant.

Sub-section.—Such servitudes shall only be altered or cease to exist provided the principles laid down in the general law be observed.

Means of Communication where no Public Roads exist.

Art. 34.—If no easier or better means of communication exist to obtain access to any neighbouring centre of population, concessionaires of land scheduled under the second class shall be bound to allow their neighbours the right of way over such lands, provided compensation therefor has been previously paid them by such neighbours.

Sub-section.—In case of non-agreement between the parties concerned as to the amount to be paid as compensation, such amount shall be fixed by a Court of Law.

Art. 44.—As a rule no concession of lands of the second class or of those situated in the suburbs of scheduled townships shall be made without there being between such lands and those adjoining a space of at least 6 metres for purposes of roadways.

Application for more than one Concession of Land.

Art. 45.—Any applicant or concessionaire shall be permitted to make application for, and obtain, more than one concession of ground.

Sub-section 1.—The Governor-General or the Governor of the District may not, however, in respect of the concessions which are in the power of either to deal with, authorize the granting of more than one concession to such applicant or concessionaire who does not offer the necessary guarantee for the proper use of all the ground applied for.

Sub-section 2.—For purposes of the last preceding Sub-section applicants shall always, on penalty of their applications not being proceeded with, attach to such applications a certificate issued by the Survey Department as to any applications previously made by them or any concession which they may have obtained.

Concessionaire's Right to admit Another Person as Partner or to cede his Rights.

Art. 46.—The authority of the Governor-General having been obtained thereto, an applicant

for a concession may admit another person as a partner in respect of such concession or cede his rights in such application, it being sufficient for the purpose to append to the application,—which shall be signed by all the parties therein interested and in which mention shall be made of the share held by each of them in such rights,—the certificate, attestation, declaration or such other documents in reference to any newly admitted party to the application, as set forth in Article 71.

Sub-section.—Such admission to partnership and ceding of rights may also be allowed by the Governors of Districts in respect of concessions with which they are competent to deal.

Applications shall be declared Null and Void of those not residing in the Capital of the Province and who have not a Legally Appointed Representative to receive Notices and Communications in Respect of their Applications. All Moneys paid in Respect of Such Application to be forfeited to the Treasury.

Art. 47.—If any applicant not being resident in the Capital of the Province ceases to have there a legally appointed representative to receive

any notices or communications which may have to be addressed in reference to the respective application, such application shall be declared null and void, and any money deposited in connection therewith shall be forfeited in favour of the Public Treasury.

Sub-section.—The same provisions shall apply in respect of applications lying within the jurisdiction of the District Governors in case the applicant does not reside or has no representative at the seat of the District Administration.

Art. 48.—In case a concessionaire absents himself from the Province without notifying the Survey Department—or the local District Survey Office where the respective concession comes within the powers of the District Governor—of the name and place of residence therein of his legal representative, any citations, summonses, notifications, or notices which may be necessary to address to such concessionaire in reference to his concession or titles thereto shall be carried out only by edict published in the *Boletim Official* of the Province and, if so ordered by a Court of Law, in the *Diario do Governo* (Lisbon).

Art. 49.—For the purposes of the two last preceding Articles, the Survey Department and

the Local Office at the seat of the District Government shall keep a special book for the purpose of registering, in alphabetical order, the place of residence of applicants for land concessions and concessionaires as well as that of their representatives.

Sub-section.—This specifies the size of the book and mode of making registration.

Expropriation of Land already granted.

Art. 50.—If any lands already granted may have to be expropriated for purposes of public utility the value of the improvements made thereon shall always be paid in money, and that of the ground proper, the parties concerned being in agreement, may be paid by the receipt in exchange of other lands comprising a corresponding area and being of the same class and order.

Sub-section 1.—In case of non-agreement or if the State has no lands of a corresponding area, class and order to offer, the value of such expropriation shall likewise be paid in money.

Sub-section 2.—The value referred to in the last preceding Sub-section shall be equal to twenty times the respective quitrent paid or which would be paid if the concession in question were a quitrent holding.

Sub-section 3.—Likewise by agreement the State may in exchange for the expropriated lands give others comprising a larger or smaller area, but of a corresponding value.

Sub-section 4.—In the case of such expropriation falling on portions only of lands held on quitrent, leasehold or which have been sold by payment in instalments, the respective quitrent, leasehold-rent or instalment shall be reduced in accordance with the decrease of the area of such holding as a result of its expropriation.

CONCESSIONS GRANTED ARE EXEMPT FROM THE PAYMENT OF PROPERTY TAX FOR THE FIRST YEAR.

Art. 51.—During the first year a concession is in existence any land granted on quitrent or leasehold shall be exempt from the operation of the Property Tax. Thereafter and while such ground remains unused the Property Tax shall be imposed thereon to the extent of 5 per centum of its value at the end of the first year, 10 per centum at the end of the second year, and shall successively be increased by another 10 per centum for each year till the concessionaire or leaseholder shall have shown that he has utilized such ground in good faith. From this provision there shall be excepted lands sold by the State

and the cases in which, owing to *force majeure*, the utilization of the ground has not been possible. The Property Tax shall be levied in each year in terms of the regulations relating thereto.

Computation of the Value of a Holding.

Sub-section 1.—The value of any holding shall, if such holding be held on quitrent, be computed on the amount of the initial payment, plus twenty times the respective quitrent prescribed in Article 63, and, if held on leasehold, it shall be computed on twenty times the leasehold rental.

No Fee for Registration.

Sub-section 2.—Whatever the form of concession no transfer dues shall be charged in connection with the registration of the ground, the first transfer subsequent to the granting of the concession being likewise exempt from such tax.

Utilization of the Ground.

Art. 52.—The utilization of the ground shall be considered as having taken place when the concessionaire shall have spent thereon a sum equal to not less than twenty times the amount of quitrent in the case of lands scheduled as

of the first class and to not less than 100 to 150 times in the case of lands of the second class.

Land Duly Utilized shall be Exempted for a Period of Ten Years from the Operation of the Property Tax.

Sub-section 1.—Any lands duly utilized in terms of this Article and any lands sold by the State in terms of the present law shall, during a period of ten years from the date of such utilization or sale, be exempted from the operation of the Property Tax; thereafter, payment of the said tax shall be made in terms of the general law and regulations relating thereto.

Sub-section 2.—If concessions of lands adjoin each other and the party interested therein wishes it, such concessions shall for purposes of Articles 51 and 52 and their Sub-sections be considered as one concession.

PART II

Those Competent to grant Concessions.

Art. 53.—With the deliberative vote of the Government Council the Governor-General shall have power:—

(1) To grant on quitrent lands up to the following limits :—

(a) 2 hectares within a classified township ;

(b) 5 hectares in the suburbs of a classified township;

(c) 10,000 hectares of lands scheduled under the second class in the district of Lourenco Marques;

(d) 50,000 hectares of the said second class lands in all other districts.

(2) To grant on leasehold for a period not exceeding nineteen years in the suburbs of classified townships up to the limits prescribed in (b), or up to the limits laid down in (c) and (d) in regard to lands scheduled as of the second class in respectively the district of Lourenco Marques and the remaining districts of the Province of Mozambique as well as to authorize the sub-leasing of such lands and also the conversion of the contract of lease into a contract of sale ;

(3) To order that a certain zone in the Province be divided into lots of 3,000 hectares each, half the number of such lots to be sold by public auction.

(4) To make free grants of lands necessary for their requirements to Administrative Bodies, Catholic Missions, and Benevolent,

Charitable, and Educational Institutions, when such fall under the conditions prescribed in Sub-section of Article 59, such concessions to be forfeited, without any rights of compensation for improvements made thereon, should the purposes for which they were granted be departed from.

Sub-section.—Grants to Catholic Missions may only be made of land scheduled under the second class and comprising up to 1,000 hectares; such grants are liable to be declared null and void, even in case of convenience to the interests of the State, without it being incumbent upon it to pay for any improvement made on the ground thus granted.

Art. 54.—Besides other powers conferred by the present law the Governor-General shall also have authority:—

(1) To grant on quitrent lands up to one-fifth of the areas specified in No. (1) of the last preceding article;

(2) To grant on leasehold for a period not exceeding nineteen years lands of the second class or lands situated in the suburbs of classified townships comprising up to one-tenth of the areas fixed under respectively (c) and (d) of Article 53 (1), and further to authorize the respective sub-leasing;

(3) To cause to be put up to public auction and to award the lots of land referred to in No. (3) of the said article;

(4) To authorize the conversion into contracts of sale of leasehold contracts with which he is competent to deal, as well as those coming under the jurisdiction of the District Governors.

(5) Besides other powers conferred by the present law the Governors of Districts shall have authority to grant on quitrent up to one-tenth of the areas prescribed in Article 53 (1), and on leasehold, for a period not exceeding five years, lands scheduled under the second class and lands in the suburbs of classified townships up to the areas for which the Governor-General is competent to make grants without the vote of the Government Council; further to authorize the sub-leasing of such concessions.

Sub-section.—Contracts of concessions on quitrent as well as those of leasehold and sub-leasing, referred to in this article, shall require to be confirmed by the Governor-General.

Art. 56.—Besides other powers mentioned in the present law, the Administradores de Concelho, Administradores de Circumscripcoes Civis, and

Capitaes-Mores shall have authority to grant on annual lease, renewable every year, areas of land up to 800 square metres for purposes of trading establishments.

PART III.

Those who may receive Concessions.

Art. 57.—The following may in terms of the present law receive concessions of State lands: —

(1) Portuguese citizens legally entitled to enter into contracts;

(2) Foreigners if they make a formal declaration that they abide in everything appertaining to the lands applied for and which may be granted them by all the provisions of the Portuguese Legislation at present in force or which may hereafter be enacted;

(3) Portuguese Societies as well as Foreign Societies legally constituted, provided that in the case of the latter the provisions of the Decree of 23rd December, 1899, be observed.

Art. 58.—Any European Portuguese who shall have resided for a period exceeding ten years in any of the Portuguese oversea Provinces may also, without a public auction being held, receive concessions on quitrent of lands scheduled as of

the second class, or of lands in the suburbs of classified townships.

Art. 59.—Free grants of land may also, in terms of Article 53 (4), be made to Administrative Corporations, Catholic Missions, and Benevolent, Charitable, and Educational Institutions.

Sub-section.—The Institutions, Corporations, and Missions herein referred to shall comprise only those of Portuguese nationality.

CHAPTER VI

QUITRENT HOLDINGS

PART I.

General Provisions.

Art. 60.—All contracts relating to land granted by the State on quitrent shall in whatever way not be inconsistent with the provisions of the present law be regulated by the Civil Code.

Quitrent Contracts.

Art. 61.—Quitrent contracts shall be held to be in order when a concession title shall have been issued and registered in terms of the provisions of Chapter XI.

New Quitrents.

Art. 62.—The consent of the Governor-General being obtained thereto, lands held on quitrent may be partitioned—thus forming new quitrent holdings—provided that all rents and taxes shall have been paid up to the date of lodging the application, and also that each of the new quitrent holdings shall not comprise an area of less than 5 hectares.

Sub-section 1.—Such division with the necessary demarcation shall be carried out at the request of the parties interested in the respective concession, it being necessary to join to the application therefor the concession title, documents showing that the quitrent and taxes in respect of such concession have been paid up to the date of making the application, declaration of the amount, if any, due under the Registration Tax, as well as the certificate, attestation, declaration, and document of legal capacity, as prescribed in Article 71, and which may be necessary in respect of the proposed new parties to the concession.

Sub-section 2.—Such applications and accompanying documents as prescribed in the preceding Sub-section, having been handed in to the Survey Department, shall at once

be attached to the documents relating to the concession and the whole prepared for submission thereafter to the Governor-General, who shall in case he deems fit to grant such request order that the said Department undertake within the period that he may fix, the division of the concession in terms of the application.

Sub-section 3.—The persons interested in such applications shall within eight days from the date of the order of the Governor-General, failing which such order shall cease to have effect, present a document showing that a deposit has been made with the Treasury covering the amount of the probable cost, according to the official tariff, of the work to be done on the ground, as well as that in connection with the issue of new titles and their registration.

Sub-section 4.—In respect of the work to be done on the ground the instructions published by the Survey Department shall be observed, provided, however, that in establishing the boundary lines and in creating any servitudes attention shall be paid to any agreement come to among the parties interested.

Sub-section 5.—A detailed declaration shall be made, by the person charged therewith, of all the work carried out on the ground in connection with the division of the concession, such document being also signed by the parties interested or their representatives. As soon as such declaration shall have reached the Survey Department it shall be signed by the Surveyor-General.

Sub-section 6.—This declaration shall be attached to the documents relating to the concession and the whole prepared for submission to the Governor-General, who shall in case the request is in all respects in circumstances of being granted order that new titles be issued in favour of, and delivered to, the parties interested after having been duly registered. Delivery of the titles shall only be effected after the persons concerned have paid the difference, if any, between the amount deposited and that due in respect of the work carried out on the ground and the registration of the new titles; if the difference be in their favour, such amount shall be returned to them.

An extract of the decision of the Governor-General shall be published in the issue next following of the *Boletim Official*, the page where such announcement appears being joined to the documents relating to the concession.

Sub-section 7.—All these different proceedings shall be completed within a period of six months.

PAYMENT OF QUITRENTS OF THE FIRST CLASS.

Art. 63.—Payment in respect of quitrents shall be :—

Sub-section 1.—In the case of quitrent holdings of the first class :—

(a) In townships of the first order, 40 reis per square metre ; in townships of the second order, 20 reis per square metre; in townships of the third order, 10 reis per square metre.

(b) In the suburbs of townships of first, second and third order it shall be 500, 200 and 100 reis per hectare respectively.

(c) In respect of lands in suburban townships the Governor-General shall fix the amount of quitrent payable thereon when deemed convenient, regard being had to the values specified in this sub-section and that next following.

Quitrents of the Second Class.

Sub-section 2.—In the case of quitrent holdings of the second class: 40 reis per hectare in respect of lands in the district of Lourenco Marques; 20 reis per hectare in the other districts of the Province.

The quitrent prescribed in this Article may, if the necessity of so doing should present itself, be increased by the Governor-General in consultation with the Government Council; it may likewise be reduced by the Government if it should in the interests of the State deem convenient so to do.

Where Quitrents are to be paid.

Art. 64.—Payment for quitrent shall be made in money at the respective Treasury Office, the years being for purposes of this payment reckoned from the date of the issue of the concession title.

Default of Payment of Quitrents.

Art. 65.—In default of payment of the prescribed quitrent the State shall, in respect of the usufruct rights of the concession holder, enjoy a similar privilege to that prescribed in Article 887 of the

Civil Code in regard to credits for taxes due to the National Treasury.

Non-payment of Quitrents. Proceedings to be taken within Ninety Days of Date when Payment was due.

Art. 66.—In case of non-payment of quitrent the necessary proceedings for the recovery of the amounts due shall be taken within ninety days of the date on which payment of such amounts was due.

No Transfer can be made while Quitrent remains unpaid.

Art. 67.—No transfer of any rights pertaining to "dominium utile" (usufruct right) shall be registered at any Deeds Office while any quitrents or taxes relating thereto remain unpaid.

Redemption of Quitrent.

Art. 68.—The Governor-General may grant complete ownership rights to any quitrent holder of second-class lands or of lands situated in the suburbs of classified townships not being in arrear with the payment of his quitrent or taxes, and who shall be prepared to pay an amount equal to twenty times the annual quitrent; under the same conditions, the Governor-General may

reduce to one real per square metre the original quitrent on lands comprised within the areas of the said classified townships.

Sub-section 1.—The amount of twenty times the annual quitrent referred to above shall never include the quitrent previously paid.

Sub-section 2.—The request or application for redemption of any quitrent must be handed in at the office of the Surveyor-General together with the concession title and documents showing that all quitrents and taxes have been paid up to date as well as an amount equal to twenty times the annual quitrent and a deposit covering the cost of the title and its registration.

Sub-sections 3 and 4 treat of the procedure to be followed by the Survey Department in proceeding with the application, a maximum of six months being allowed for the completion of the conversion of the quitrent concession into a freehold.

Art. 69.—If the parties thereto be agreed any casual clauses may be inserted in the quitrent contracts.

Art. 70.—Freehold ownership ("dominium directum") is imprescriptible.

PART II.

Procedure to be followed in granting Quitrent Holdings.

Art. 71.—Any one wishing to obtain a concession on quitrent of a stand within the boundaries of a classified township shall make an application to the Governor-General when the concession desired falls within his exclusive jurisdiction; to such application there shall be attached besides a declaration showing that a deposit has been made with the Public Treasury covering the amounts of the respective initial payment and of the expenses with the title to be issued and its registration at the Deeds Offices, also an identification certificate (Form F), in the case of an applicant not being known to the Survey Department, the attestation referred to in Subsection 2 of Article 45 and the declaration mentioned in Article 57 (2) should the applicant be a foreign subject; and the documents proving legal capacity in the case of Societies in terms of Article 57 (3).

A Sub-section declares that Administradores de Concelhos, Administradores de Circumscripcoes Civis, and Capitaes-Mores are competent to issue identification certifi-

cates. In the case of foreign subjects such certificate may be issued by the respective Consul in terms of Form F.

Information to be specified when applying for a Quitrent Holding.

Art. 72.—The application referred to in the last preceding Article shall specify besides the name, age, whether single or married, calling, place of birth and that of residence of the applicant, and, in the case of a Society, its title, head office, names of directors and that of its representative in the Province, also the portion of ground desired, giving number of stand, situation, area, and boundaries.

Mode of Procedure followed by the Survey Department.

Articles 73 and 74 prescribe the mode of procedure to be followed by the Survey Department in dealing with such an application.

Sub-section of Article 74 prescribes that the Surveyor-General is to inform as to the conveniency or otherwise of the grant being made and as to the manner in which the applicant has made use of previous concessions, if any has been granted him. Within the period specified, which is not to exceed

thirty days save in exceptional cases, such application together with the information of the Surveyor-General and other documents is to be submitted to the Governor-General for his decision.

Public Auction.

Article 75 prescribes that within three days of the date of the receipt of the documents from the Survey Department the Governor-General shall, when not deeming inconvenient the making of such a grant, cause a Public Auction to take place on the day and hour specified by him, and further state the clauses to be inserted in the respective contract.

Article 76 and its sub-sections deal with the notice to be issued and published by the Survey Department in connection with the holding of the said Public Auction.

Place of Sale.

Art. 77.—The Auction shall be held at the Survey Department in the presence of the Land Commission on the day and hour specified by the Governor-General, and which shall have been made public by the issue of notices and advertisements.

Sub-section 1.—The President of the Commission of Lands or in his absence the

member next to him shall cause the opening of the Auction proceedings to be announced by the official of the Survey Department acting as crier, and the stand applied for to be put up to auction subject to all the conditions of the respective contract.

Sub-section 2.—The crier shall make a note of the bidders and the prices offered, and, the bidding having ceased, shall declare the highest bid and the name of the person making it.

Sub-section 3.—Bidding shall only be in respect of the initial payment to be made.

INITIAL PAYMENT.

Sub-section 4.—By initial payment shall be understood the payment of an amount serving to adjust the differentiation between the quitrent and the value of the ground applied for in comparison with other lands. That amount upon which bidding is to take place, shall upon consultation with the respective department be fixed by the Governor-General in reference to each case. Its value shall be assessed between the amount corresponding to one year's quitrent and that of twenty years' quitrent in terms of Article 63, and

together with the increase, if any, resulting from the bidding shall belong to the Treasury.

Persons who may bid at an Auction.

Sub-section 5.—Besides the applicant the only persons allowed to bid shall be those who before the opening of the Auction proceedings have put in the documents referred to in Article 71.

Sub-section 6.—The documents referred to in the last preceding Sub-section as well as any power of attorney shall by the clerk who has charge of the papers relating to the proposed concession be attached thereto without any order being required so to do.

Power of Attorney sent by Telegram.

Sub-section 7.—A power of attorney conveyed by telegram shall be allowed to be put in, provided, however, that any action taken by the person acting as proxy shall be null and void should the principal fail to forward by the post next following, in order to be attached to the relative documents, another power of attorney conforming to the terms of the Civil Code.

Sub-section 8.—The Auction proceedings shall not be closed until a quarter of an hour at least has elapsed after the last bid has been made.

Sub-section 9.—This Sub-section provides for the drawing up of a statement (Form H) of all that takes place at the Auction, such statement to be signed by the members of the Land Commission, the highest bidder, the clerk, and the crier. In this statement all the clauses of the contract are to be clearly specified.

Sub-section 10.—The Land Commission or the members thereof present shall have power to give a decision on all questions arising during the Auction proceedings.

Sub-section 11 provides that in the case of there being no competition no Auction shall be held, and that the applicant or his representative is to sign a declaration to the effect that the former agrees to all the clauses of the contract.

APPLICANT OR HIS REPRESENTATIVE MUST ATTEND THE AUCTION, OTHERWISE HE WILL FORFEIT THE MONEY HE HAS DEPOSITED WITH THE TREASURY.

Sub-section 12 provides that should the applicant or his representative not be present

at the time specified for the holding of the Auction or within an hour thereof and there being no competitors all documents in connection therewith are to be sent immediately to the Governor-General, who will declare the amounts deposited by such applicant to be forfeited in favour of the Public Treasury.

THE HIGHEST BIDDER: HIS PAYMENTS TO THE TREASURY.

Art. 78.—The highest bidder shall within five days of the date of the holding of the Auction deposit with the Treasury the amount corresponding to the difference between the sum already deposited in respect of the initial payment and that of his bid, the necessary vouchers to do so being delivered to him immediately after the holding of such Auction.

A Sub-section of the Article states that should this provision not be complied with the papers relating thereto are to be submitted to the Governor-General for the purpose of the Auction being declared null and void and of day and hour being fixed for a new one; the amounts deposited by the bidder, who is not again to be admitted to bid in connection with the same applica-

tion, are to be forfeited in favour of the Public Treasury.

Documents to be submitted to the Governor-General.

Art. 79.—The acknowledgment of deposit referred to in the last preceding Article having been attached to the documents relating to the proposed concession, the whole of such documents shall be immediately submitted to the Governor-General, who shall, within three days, in case he assents to the price offered at the Auction and does not, in regard to the highest bidder, make use of the power conferred on him by Sub-section 1 of Article 45, award the concession to such bidder.

Governor-General may declare an Auction Null and Void.

Sub-section 1.—In the case of the Governor-General not agreeing to the price bid for at the Auction or should he exclude the highest bidder, he shall declare such Auction null and void, the amounts deposited being returned to the respective competitors. In such a case he shall order that a new Auction take place.

Sub-section 2.—If the reason for declaring the Auction null and void be on account of

the exclusion of the highest bidder, such highest bidder shall not be allowed to compete at the new Auction.

Sub-section 3.—In his decision the Governor-General may revoke any decision taken on any question arising during the Auction proceedings, and order that a new Auction be held, the whole process in connection with the former one being declared null and void.

Sub-section 4.—In the case of the Governor-General deciding to award the concession he shall in giving his decision fix the period within which the concession title shall be delivered to the concessionaire and warrants issued for the withdrawal of the deposit made by the unsuccessful competitors. In fixing these periods the said authority shall take into consideration the distance at which is situated from the Capital of the Province the Deeds Office where the registration of such title is to be made, but such period, unless it be in exceptional cases, shall not exceed forty days.

Sub-section 5 prescribes that in the case of a second Auction being held a procedure similar to that provided for the first Auction is to be followed.

Articles 80 and 81 and their Sub-sections deal with the procedure to be followed by the Survey Department in the issuing of the titles and in completing the documents relating to the concession.

Applications for Large Areas of Land.

Art. 82.—If owing to the size of the area applied for the concession falls under the jurisdiction of the Governor-General with the deliberative vote of the Government Council, in the process relating thereto all the provisions of the preceding articles shall be observed, subject to the following modifications:

(1) The provisions of Article 75 having been observed, the application and relative papers shall be submitted to the Government Council by the Inspector of Public Works in order that that body may authorize or otherwise the holding of the Public Auction, and, in the former case, prescribe the clauses to be inserted in the contract. In case of disagreement between the Government Council and the Governor-General the provisions of No. 4 below shall be observed.

(2) and (3) deal with the procedure to be followed by the Survey Department after

the proposed concession has been either approved or negatived by the Government Council.

(4) If, contrary to the opinion of the Governor-General, the Government Council either approves or negatives the concession, the papers relating thereto together with a copy of the minutes of such meeting of the Council and an explanatory statement shall by the post next following be forwarded to the Secretary of State for the Colonies in order that the matter be decided by him within a fortnight following on the receipt of the documents, by means of a Decree specifying the grounds for such a decision; thereafter all documents together with a copy of the *Diario do Governo*, in which such Decree appears, shall be returned immediately to the Survey Department, where the procedure to be followed shall be as if the decision had been given by the Governor-General.

Application for Quitrent Concessions of any Land of the Second Class.

Art. 83.—Any one wishing to obtain a concession on quitrent of any land of the second class not yet demarcated or of lands situated in the

suburbs of classified townships shall, if such concession falls within the exclusive jurisdiction of the Governor-General, request in the first place, verbally if he so desires, either personally or through a competent representative at the Survey Department or at any of its District Offices a licence (Form I) for the selection and provisional demarcation of lands.

Sub-section 1.—This licence which is to hold good throughout the Province for a period of one year shall be recorded in a special book (Form J).

Sub-section 2 fixes the amount of such licence at 5,000 reis, one-half of which is Treasury revenue and the other half being divided, proportionately to their fixed salaries, among the officials of the office issuing it.

Sub-section 3 provides that licences are only to be issued to persons known to the Department concerned or, this not being the case, on presentation of an identification certificate as specified in Article 71.

Selection of Land and marking Boundaries.

Art. 84.—Any person who has been supplied with such a licence may select the land he wishes and shall mark its boundaries with iron or wooden beacons of a height of not less than

1·50 metre, each of these beacons having at the top a board containing legibly written thereon the name of the applicant, date of the provisional demarcation, and number and date of the licence. Such beacons shall be placed in such a way that from any of them the beacon in front and the preceding one may be seen.

Where Land may be selected.

Art. 85.—Such land may only be selected where there are clearly no traces of occupation or any indication of rights of a third party, the provisions of Article 12 being also observed in this respect.

Sub-section.—Lands occupied by natives are excepted; such lands may in terms of Article 20 be comprised in the area demarcated.

Fines for Malicious Demarcation.

Art. 86.—Any one who shall maliciously demarcate any lands in contravention of the provisions of the last preceding article shall, besides being liable for the payment of damages, incur the penalty of Article 445 of the Penal Code.

Fines for Destruction or Removal of Pegs.

Art. 87.—Any one who, not being authorized thereto by the pegger of the ground or the

competent authority, takes out, destroys, changes or alters any of the beacons referred to in Article 84 shall come under the provisions of Article 446 of the Penal Code.

Procedure to be followed after pegging.

Art. 88.—The ground having been provisionally demarcated and information thereof immediately communicated to the Administrador de Concelho, Administradores de Circumscripcoes Civis, or Capitaes-Mores of the respective area, the pegger shall within the next sixty days make an application to the Governor-General for the desired concession, such application to be accompanied, on penalty of it not being proceeded with, by all the documents required under the provisions of Article 71, and the licence in addition.

Sub-section 1.—The amount of the initial payment shall be reckoned in terms of Sub-section 4 of Article 77, regard being had to the approximate area of the lands provisionally demarcated and their position in relation to routes, classified townships, railway stations, etc.

Sub-section 2.—In the case of the pegger not applying for the concession of the land within the period stipulated in the present

Article the demarcation of the ground carried out by him provisionally shall be deemed of no effect.

PARTICULARS TO BE SUPPLIED BY THE APPLICANT.

Art. 89.—Besides specifying the name, age, whether single or married, calling, place of birth and place of residence of the applicant, or, being a Society, its title, head office, names of directors and that of its representative in the Province, the application referred to in the last preceding Article shall contain :—

(1) A description of the ground as detailed as possible, its position and approximate area, nature of vegetation, springs and streams, number of boundary posts or beacons with the necessary notices affixed thereto, as well as all other particulars necessary for purposes of identification of the land in question.

(2) A declaration to the effect that in demarcating such land the provisions of Article 85 were complied with.

(3) In case of there being huts or crops belonging to natives, a statement of their number and approximate area, as well as a declaration as to whether or not the applicant wishes that the lands

occupied by the natives be included in the concession.

(4) A declaration as to whether or not the applicant desires to take possession of the land immediately.

(5) A declaration as to whether the applicant desires the survey and drawing of plans as well as the final demarcation of the ground to be carried out at his expense by the Survey Department, or by a private sworn Surveyor, in the latter case the name of such sworn Surveyor being stated.

Sub-section 1.—The Governor-General may permit the applicant to occupy immediately the lands provisionally demarcated, provided however that such occupation shall not, if such lands are not finally awarded to him, give him any right to any improvements he may have carried out on the ground.

Sub-section 2.—Any applicant or his representative who shall in making the application prescribed in this Article state wrongly his name, situation, as to whether single or married, calling or place of birth, and likewise any one making any false declarations which result or may

result in damage being done to the State or to a third person shall, save if such wrong action or declaration be subject to a more severe penalty, incur the punishment prescribed in Article 242 of the Penal Code; such penalties shall be imposed irrespective of the whole concession process being declared null and void and the deposits made by the applicant being forfeited in favour of the Public Treasury.

Survey, Edicts, and Notices.

Art. 90.—The decision of the Governor-General in connection with the application referred to in the two last preceding Articles shall be written thereon immediately, ordering that the Survey Department shall proceed with such application and publish edicts and notices calling upon all who think they have a right to the ground to adduce proof thereto within the period allowed for the purpose.

Sub-section 1.—In giving this decision the Governor-General may authorize the occupation of the ground in terms of Sub-section 1 of the last preceding Article.

Sub-section 2.—The Governor-General shall in fixing the period during which objections are allowed to be lodged take into considera-

tion the distance at which the ground applied for is situated from the Capital of the Province, it being convenient that in the case of such ground being situated outside the district of Lourenco Marques, a period of at least 60 days shall intervene between the final date and that of the issue of the *Boletim Official* containing the notice.

Article 91 and its Sub-section deal with the case of an applicant having previously obtained a concession and not made proper use of it, in which case the application is to be negatived by the Governor-General and the deposit returned to such applicant.

Objections to Applications and Applicant's Right of Reply.

Art. 92.—Within five days from the last day appointed for lodging objections the applicant may oppose any objections thus lodged, for which purpose he shall be shown them.

Articles 93 and 94 treat of the procedure to be followed by the Land Commission and the Governor-General in dealing with objections and the refutation thereof by the applicant.

If Objections be Valid, the Concession is declared Null and Void.

Art. 95.—The objections lodged being deemed valid, the whole process shall be declared null and void and the respective Administrative Authority shall order the immediate removal of the beacons marking the boundaries of the land applied for.

Sub-section.—The moneys deposited and documents put in shall be returned to the applicant, unless it be shown by such documents that in carrying out the demarcation adjudged invalid the applicant did so with malice or fraud, for in such a case he shall, besides being liable to the imposition by the competent court of the penalties specified in Article 86 and being debarred from again applying for any concession of land in the Province, forfeit in favour of the Public Treasury such amounts as he may have deposited.

Objections may be decided by the Civil Court.

Art. 96.—In case the Governor-General deems that the objections raised may only be decided by a Civil Court he shall either declare the proceedings so far to be null and void, the amounts deposited and documents put in being returned to

the applicant, or order that the necessary legal action be taken and that such proceedings be stayed until a decision has been given by the Court.

Sub-section.—In the latter case a document containing the decision of such a Court shall in due time be attached to the papers relating to the proposed concession, and, in accordance with such decision, the Governor-General shall order that the concession be proceeded with or else the proceedings thereof terminated at this stage. In the latter case the exception referred to in the Sub-section of the last preceding Article may become operative.

Procedure when no objections are lodged.

Art. 97.—Within three days following on the last day fixed for lodging objections, if no such objections are lodged, or following on the date of the issue of the *Boletim Official* in which an extract has been published of the decision declaring the objections put in to be invalid the Survey Department shall, if the applicant has requested that the work in connection with the survey, drawing of plans and final demarcation of the ground be executed by the said department, give notice by registered letter to such applicant or his represen-

tative to deposit with the Public Treasury an amount corresponding to the probable cost, in terms of the official tariff of such work.

Failure of Applicant to comply with Provisions of Article 97.

Art. 98.—This states that in case of failure of the applicant to comply with the provisions of the preceding Article the process is to be declared null and void and the original deposit made by such applicant is forfeited in favour of the Public Treasury.

Art. 99.—The deposit covering the cost of such work having been made, or the applicant having requested that the work be carried out by a sworn land surveyor, the Survey Department or such sworn surveyor shall communicate immediately to the adjoining landowners the date on which such work is to commence.

Sub-section.—Such communications shall be made by registered letter or, in the case of such landowners being absent from their places of residence, through the medium of publication in the *Boletim Official.*

Particulars as to the Survey of the Land applied for.

Art. 100.—Such instructions as are published by the Survey Department shall be strictly fol-

lowed in carrying out the work of survey, drawing of plans, and final demarcation.

Sub-section 1.—A deed (Form K) containing a minute description of all the work executed as well as of everything which may take place in connection therewith or concern the proposed concession, such as existing or proposed servitudes, traces of former occupation, objections by adjoining landowners or by natives occupying portions of the ground concerned, shall be drawn up by the person charged with the work of survey and demarcation, such deed to be signed, if possible, by all who shall have intervened in these proceedings and are able to write.

Sub-section 2.—In case of there existing on the ground huts or crops belonging to natives the areas thus occupied shall be demarcated and shown on the plans, mention being also made, in the deed referred to in the preceding Sub-section, of their value in accordance with Article 21 ; in the said deed an extract shall be given of any titles of occupation possessed by such natives, together with a declaration by the said natives, as to whether or not they wish to continue to reside on such lands. It must

be explained to such natives that they may continue to reside thereon, and that in case of their preferring to leave them they shall receive due compensation.

If the Governor-General, making use of the powers conferred on him by Articles 20 and 21, authorizes the expropriation of the areas occupied by natives, the demarcation referred to in this paragraph shall be cancelled and shall not appear on the plan to be attached to the concession title.

Sub-sections 3, 4, 5, and 6 deal with the carrying out of the work of survey and demarcation, it being provided in Sub-section 5 that, in the case of the concessionaire not being the original applicant, such concessionaire shall be charged for such work 20 per cent. more than the official tariff.

Method to be followed after the Completion of the Survey.

Art. 101.—This Article provides that after the survey has been completed all documents are to be submitted to the Governor-General, who within five days will decide on any objection or complaint contained in the respective deed, authorize or otherwise the expropriation of any areas occupied by natives, fix the compensation, state day and hour for the holding of the Public Auction, and

stipulate the clauses to be inserted in the quitrent contract.

Art. 102.—In the case of an objection which has been deemed valid affecting the result of the survey, the necessary rectification shall in accordance with the decision given, be immediately carried out.

Those who may bid at the Auction.

Art. 103.—The decision referred to in Article 101 having been given and there not arising the case stated in Article 102, the process shall be proceeded with in terms of Article 76 and those following, with, however, the modifications noted hereunder :—

(1) Besides the applicant there shall only be allowed to bid those who before the time fixed for the holding of the Auction have put in the documents specified in Article 71, and also a certificate of deposit of the amounts of compensation to be paid to natives as prescribed in Article 101, and the exact cost, in accordance with the official tariff, of the survey work with an addition of 20 per cent.

(2) The applicant himself shall at this stage of the process—before the holding of the Auction—deposit the amount assigned as

compensation on penalty of not being allowed to bid and, should no other competitors present themselves, of losing all amounts paid by him till then;

(3) The applicant shall have the right of preference at the Auction provided he use such right in the case of each bid by any competitor.

(4) Should the person who obtained the concession be other than the original applicant the Governor-General shall in awarding the concession order that to such original applicant be returned the amount deposited by him in connection with the cost of survey and demarcation; in this amount shall be included the additional 20 per cent. referred to in No. (1) above and Sub-section 5 of Article 100.

(5) In his decision awarding the concession the Governor-General shall likewise order the payment of the amounts, if any, fixed by him in respect of compensation to native occupiers, such payment being in accordance with Sub-section 3 of Article 21.

Second-class and Suburban Lands.

Art. 104.—This Article provides that when the granting of concessions of lands of the second

class or of lands situated in the suburbs of classified townships falls under the jurisdiction of the Governor-General with the deliberative vote of the Government Council the stipulations of Article 83 and following are to be observed, but the decision referred to in Articles 101 and 97 (the latter in virtue of Article 103) are to be replaced by the decision of the Council in respect to authorizing the holding of the Public Auction, the clauses to be introduced in the contract and the awarding or withdrawing of a concession. In other respects all questions arising in connection with such concessions are to be dealt with exclusively by the Governor-General. Should any disagreement occur between the Government Council and the Governor-General the provisions of Article 82 (4) are to become operative.

Concessions falling under the Jurisdiction of a District Governor.

Art. 105.—In cases in which the granting of concessions falls within the jurisdiction of a District Governor the course indicated in the preceding Articles with reference to concessions within the exclusive competence of the Governor-General shall, subject to the following modifications, be adhered to :—

(1) The Governor-General is replaced by the

District Governor, and the Survey Department and Land Commission by their respective local sections and delegations.

(2) If within the period fixed for the lodging of objections any such objections are put in, or if on the ground there exist areas occupied by natives whether in terms of Article 15 or without occupation title, and the applicants not withdrawing their applications, such questions shall be decided upon by the Governor-General, to whom the relative documents shall be sent through the Surveyor-General, being thereafter returned to the respective local District Office in order that such decision be complied with and the process follow its course. In the same way any titles signed by the District Governor shall be sent, together with all documents relating to the concession, to the Governor-General for the necessary confirmation.

(3) On the completion of the process copies of the respective concession titles shall without delay be sent to the Surveyor-General's Office.

(4) The Public Auction shall take place at the Capital of the District where the land applied for is situated.

Conditions for granting Concessions to European Portuguese.

Art. 106.—In the case of concessions permitted by Article 58 the procedure laid down in Article 83 and succeeding articles is to be followed up to the completion of the survey of the ground applied for, the only modification of this mode of procedure being that, in place of the requisite receipt or warrant of deposit in respect of the initial payment, a document is to be put in testifying to applicant being a European Portuguese and having resided in any Portuguese oversea possession for a period of more than ten years: thereafter the following shall be observed:—

(1) If the concession comes within his exclusive jurisdiction, the Governor-General shall, on the relative documents being presented to him, after the completion of the survey work, during the carrying out of which no complaints entitled to consideration have been lodged and registered, and he deeming that the application is in terms of being granted, award the land and order that the respective concession title be issued subject to the insertion of the clauses he may direct.

Sub-section.—If such land comprises any areas occupied by natives in terms of Article 15, or in respect of which no title has been granted, the Governor-General shall in his decision take into consideration the provisions of Articles 20 and 21, *i.e.*, he may or may not authorize the expropriation of such areas. In the former case he shall fix the amount to be paid as compensation. Such amount shall, on penalty of the whole proceeding being declared null and void, be paid within 30 days following on the decision granting the concession.

(2) If the concession comes within the jurisdiction of the Governor-General with the deliberative vote of the Government Council the documents connected therewith shall, on the completion of the survey work, be presented to the latter, in order that the Council may authorize the concession on the terms it may prescribe or negative same, the procedure thereafter being the same as in the case of a concession falling within the exclusive authority of the Governor-General.

Sub-section 1.—In case of divergency between the Government Council and the Governor-

General the provisions of Article 82 (4) shall be observed.

Sub-section 2.—In case complaints have been lodged during the carrying out of the survey work or there be on the ground areas occupied by natives in terms of Article 16, all documents relating to the proposed concession have in the first place to be submitted to the Governor-General, the above matters coming under his exclusive jurisdiction.

Extending Period fixed in Procedure connected with Proposed Concessions.

Art. 107.—If weighty reasons obtain therefor, it is permissible for the Governor-General to extend any period he may have fixed in the procedure connected with any proposed concession.

Sub-section.—This power may be exercised by the Governor-General at the request of the persons interested in any such concession or even at that of the Survey Department.

Quitrent Concessions—Stamps and Fees.

Art. 108.—This article states that in connection with quitrent concessions no stamp fees are

due save in respect of applications, objections, and refutations by any interested party, as well as any accompanying documents, all of which must be duly stamped.

Such documents are not to comprise demarcation licences, receipts or warrants in respect of any deposit made at the Treasury Office and concession titles, all of which are exempt from stamp duty.

Procedure in making Deposits and effecting Withdrawals.

Article 109 and its Sub-sections prescribe the procedure to be followed in making deposits and in effecting withdrawals.

Definition of Applicant and Intending Applicant.

Article 110 defines as an "intending applicant" he who takes the preliminary steps to obtain a concession; as an "applicant" he who applies for it and from the moment the application is handed in; and as a "concessionaire" he in whose favour a decision has been given by a competent authority awarding the concession applied for.

CHAPTER VII

GRANTS ON LEASEHOLD

SPECIAL PROVISIONS

Leasehold Contract governed by the Civil Code.

Art. 111.—Contracts of leasehold of State lands shall, in as far as it is not inconsistent with the provisions of the following articles, be governed by the Civil Code.

Proof of Leasehold Contract.

Art. 112.—The relative title constitutes proof of a leasehold contract.

Leasehold Grants.

Art. 113.—Grants on leasehold can only be made in respect of lands scheduled under the second class or of lands situated in the suburbs of classified townships.

Sub-section.—Exception is made in the case of grants falling under the jurisdiction of Administradores de Concelho, Administradores de Circumscripcoes Civis and Capitaes-Mores, which may be made in respect of

demarcated stands within classified townships not being the capital of an administrative district.

Period of Leases.

Art. 114.—Leases shall be for periods of one year; of one to five years; and of one to nineteen years; in accordance with the provisions laid down in respectively Articles 56, 55, 54 (2), and 53 (2).

"First Leases."

Art. 115.—In the case of a first lease the rental is to be fixed by the authority making the concession, but it shall not, however, be less than ten times the amount of quitrent to which the land leased would be subject if granted as a quitrent concession; in leases effected thereafter rentals shall be determined by public auction, at which the basis of price, if such basis is not raised by the competent authority, shall be the amount of rent previously paid.

Sub-section 1.—By "first leases" are understood those relating to lands not yet demarcated.

Sub-section 2.—In respect of leasehold contracts coming under the jurisdiction of Administradores de Concelho, Administra-

dores de Circumscripcoes Civis and Capitaes-Mores, the rentals chargeable shall be those which the Governor-General may hereafter fix by special proclamation; in the absence of such proclamation they shall be equal to the minimum limit stipulated in the present Article in regard to leasehold contracts for lands of the second class or those situated in the suburbs of classified townships, and to half that limit in the case of stands or plots coming under the provisions of the sub-section of Article 113.

PAYMENT OF RENT MUST BE MADE IN ADVANCE.

Art. 116.—Payment for rent shall always be made in money and in advance at the respective Treasury Office, the years being reckoned from the date of the concession title.

NON-PAYMENT OF RENT.

Art. 117.—In case of non-payment of rents the provisions of Article 66 shall operate if the leasehold contract be for more than one year.

SUB-LEASING OF LAND.

Art. 118.—Subject to the liability imposed on leaseholders by Article 1605 of the Civil Code, and

subject further to all rents and taxes being paid up to date, the sub-leasing of lands granted on leasehold may be authorized.

Sub-sections 1 to 4 deal with the procedure to be followed in authorizing such sub-leasing. An application therefor has to be made to the competent authority through the respective Survey Office, the following documents being attached thereto: Proof of all rents and taxes having been paid up to date of application; certificate, attestation, declaration and other documents as per Article 71 respecting the proposed sub-leaseholder; concession title, on which an extract of the decision given in connection with the application is to be recorded. Transfer can only be made after authority thereto has been published in the *Boletim Official.*

Leaseholds may be converted into Concessions by Sale.

Art. 119.—Any leasehold contracts not being leases falling under the jurisdiction of Administradores de Concelho, Administradores de Circumscripcoes Civis and Capitaes-Mores, may, up to within six months previous to the expiry of such contracts, be allowed to be converted

into contracts of concession by sale, provided that concessionaires prove that they have paid all rents and taxes due up to the date of making application.

Sub-section 1.—In the case of the conversion being permitted the respective leases cease on the date on which the decision is published in the *Boletim Official*.

Sub-section 2.—The procedure to be followed in the conversion of the contract of leasehold into a contract of sale is in terms of Article 146.

Sub-section 3.—In the case of lands granted on lease by any of the officials mentioned in the first part of this Article leaseholders enjoy a preferential right when applying for the concession of such lands on a quitrent basis, but in order that this right be assured them they must attach to the application their leasehold title. If the procedure to be followed be that laid down in Article 83 and following Articles the licence and demarcation referred to in that Article and the following ones shall be dispensed with.

Order to Concessionaire to Quit.

Art. 120.—Besides the cases in which, in accordance with Article 1607 of the Civil Code,

an order of ejectment can be served on a concessionaire (*i.e.*, when the concessionaire does not pay his rentals on due date and when he puts the property to a different use to that for which it is suited or for which it was leased him), a similar order may be served in the case of any lands leased being required by the State.

Concessionaire's Rights for Improvements.

Art. 121.—Concessionaires holding lands on leasehold shall not be entitled to any improvements carried out by them on such lands except in the case of the concession referred to in Article 119 being granted them, or when, such improvements having been made during the period of currency of the respective contract, the State, requiring such lands, orders that the concessionaire relinquish them before the expiration of the contract period.

Sub-section 1.—To concessionaires is vouchsafed the right to remove, when such can be done without detriment, any improvements made for purposes of recreation, and which are not of an essential nature.

Sub-section 2.—The second exception of the present Article holding good, which exception shall never entitle the holder

to any extension of occupation, compensation for improvements carried out by the concessionaire shall be paid as may be mutually agreed upon, and in default of any such mutual agreement as determined by a Court of Law.

Preparation of Inventory of Improvements.

Art. 122.—This Article and its Sub-section provides for the drawing of an inventory by the Survey Department, within the last month of the currency of a lease, of all improvements existing on the lands leased, showing the nature of such improvements and their respective value, the said improvements comprising buildings, machinery, plantations, crops, and fruits.

Second or Subsequent Leases.

Article 123 deals with the case of a second or subsequent lease in which case the concessionaire obtains possession of the lands from the Survey Department, signing a deed to this effect. In the case of his not agreeing to the assessed value for improvements shown in the delivery deed, the leaseholder may appeal to the respective District Governor, who shall, upon hearing the opinion of three arbitrators selected by himself, determine the value of such improvements.

Improvements the Property of the Concessionaire.

Art. 124.—The deeds refered to in the two last preceding Articles are to be dispensed with whenever the leasehold contract is converted into a contract of sale in terms of the provisions of Article 119, the improvements effected being in such case the property of the concessionaire.

Penalty for removing Anything of Value belonging to the State or which should belong to New Leaseholders.

Art. 125.—Any one removing from lands held on lease anything of value belonging to the State or which should belong to new leaseholders shall, besides being liable for damages, incur the penalty specified in Article 453 of the Penal Code.

Sub-section 1.—Any one destroying anything of value, inclusive of fruits not in a condition to be gathered at the termination of any lease, shall also become subject to the penalty imposed by Article 472 of the Penal Code.

Sub-section 2.—In case the quantum of the value of the object removed or destroyed cannot be ascertained, the respective value shall, for purposes of the classifica-

tion of the crime, be considered to be over 100,000 reis.

Sub-section 3 deals with the proceedings to be taken against persons committing the above-mentioned acts, those authorized to take such proceedings being the officials of the Survey Department, Administradores de Concelho, Administradores de Circumscripcoes Civis and Capitaes-Mores.

Sub-section 4.—Concessionaires who may by a civil or criminal court be convicted in terms of the provisions of the present Article and its Sub-section 1 shall never again obtain concessions of land in the Province.

LANDS HELD ON LEASE—ACCESS CANNOT BE DENIED OFFICIALS MAKING VISITS OF INSPECTION.

Art. 126.—For the purposes of the preceding Articles access to lands held on lease cannot be denied to the officials mentioned in Sub-section 3 of the last preceding Article, it being incumbent upon such officials when making visits of inspection to do so without causing any unnecessary annoyance.

LANDS TO BE AUCTIONED—ACCESS CANNOT BE DENIED TO INTENDING BIDDERS.

Art. 127.—Any one proving to be in a position to compete at a public auction at which lands held

on lease are again to be offered on a leasehold contract shall be allowed, within reasonable limits, to inspect the buildings, machinery, and crops existing on such leased lands.

A sub-section of this Article states that a certificate issued by the Survey Department to the effect that the proposed competitor has complied with the conditions entitling him to bid at the auction shall be a sufficient document for purposes of the above-mentioned inspection.

LEASEHOLDERS' RIGHT OF PREFERENCE IN CONNECTION WITH CONTRACT OF LEASE NEXT FOLLOWING.

Art. 128.—Leaseholders shall always have the right of preference in connection with the contract of lease next following, provided they make use of such right before the minute of the auction proceedings is drawn up.

STATE OWNERSHIP OF LANDS LEASED.

Art. 129.—The rights of ownership by the State to the lands leased are imprescriptible.

SECTION II.—PROCEDURE TO BE FOLLOWED IN GRANTING LEASEHOLD CONCESSIONS

PROCEDURE IN GRANTING FIRST LEASES.

Art. 130.—The terms of procedure in granting first leases, as defined in Sub-section of Article

115, are those laid down in Article 106, subject to the following modifications: —

(1) Applicants are not required to attach to their initial application either the acknowledgment or warrant of deposit in respect of the initial payment, or the document referred to in the said Article 106 in regard to European Portuguese who have resided in any Portuguese oversea possession for a period of more than ten years.

(2) When assenting to the request for the concession the Governor-General or the Government Council shall determine the amount of rental in terms of Article 115, and also the further clauses of the contracts of lease.

(3) Within five days following on the publication in the *Boletim Official* of the decision granting the lease the concessionaire shall, on penalty of the concession becoming void and of his being debarred thereafter from obtaining any concession on leasehold in this Province, deposit with the Treasury Office the amount of rental for the first year as well as an amount covering any compensation which may have to be paid to natives.

(4) This states that the whole proceedings are to be declared void by the Governor-General in case the deposit referred to above is not made within the period therein mentioned.

Expiration of Leases—Auction Sales.

Art. 131.—In leasehold concessions where the lands are already demarcated, and in the matter of which the Governor-General has power to act exclusively or with the deliberative vote of the Government Council, the following shall be observed:—

(1) If within the last six months of his contract the leaseholder, when entitled to do so, does not apply for the conversion of his leasehold contract into one of sale, and the State not deciding to use the lands for other purposes, the Survey Department shall submit the papers relating thereto, with the necessary information, to the Governor-General or the Government Council as the case may be, in order that they may determine the basis of price at which the ground is to be offered at a new public auction, and likewise the period for which the contract is to run and all further clauses of the new lease.

(2) Such auction shall be duly advertised and shall be held on the day and hour stipulated by the Governor-General. There shall only be allowed to bid at the auction those who before the opening of the proceedings have put in all documents which must accompany an application as specified in Article 71, save that referring to the deposit in respect of the initial payment, the latter of which is replaced by a document showing that a deposit has been made corresponding to the amount fixed as upset price at the said auction.

(3) The holder of the contract of lease in force, who has the right of preference, is only required to put in a document showing that a deposit of the amount referred to has been made.

(4) After the auction all further procedure shall conform to the provisions of Article 78 and succeeding ones, attention being paid to the provisions of Article 82 in the case of the concession falling under the jurisdiction of the Governor-General with the deliberative vote of the Government Council.

(5) The new title shall be delivered to the concessionaire in time for him to enter into possession of the land on the day follow-

ing that on which the previous contract expired.

Proceedings under Jurisdiction of a District Governor.

Art. 132.—Subject to the modifications specified in Nos. 1, 2, 3, and 4 of Article 105 the provisions of the two last preceding Articles are to be observed in respect of concessions on leasehold falling under the jurisdiction of a District Governor.

Leases of Lands for Commercial or Industrial Purposes.

Art. 133.—Leases of lands for industrial or commercial purposes which fall under the jurisdiction of Administradores de Concelho, Administradores de Circumscripcoes Civis and Capitaes-Mores are to be granted to those applying for them, provided such applicants prove, if not known, their identity in accordance with Subsection of Article 71, and likewise that they are in a position to carry on commercial or industrial undertakings in terms of the respective "Regulamento da Contribuicao Commercial e Industrial" (Commercial and Industrial Tax Regulations).

Sub-section 1.—Such proofs having been established, the boundaries of the ground applied

for shall, not being lots or stands already demarcated, be marked off by means of at least four masonry beacons.

Sub-sections 2, 3, and 4 deal with the drawing up of the contract of lease and its registration.

Sub-section 5.—This permits an appeal to be made within ten days to the Governor of the respective district from any decision given by any of the above officials in the matter of the leasing of lands for commercial and industrial purposes. For this purpose it is sufficient to state the reasons for appealing. Such appeal is to be lodged with the official who gave the said decision, and who shall forward it to the Governor of the District. The latter is to decide the matter within thirty days.

Renewal of Such Leases.

Article 134 and its Sub-sections deal with the renewal of such contracts of lease.

Concessions on Leasehold.

Art. 135.—In the matter of concessions on leasehold the provisions of Articles 86, 87, and 89 (Sub-sections 1 and 2), and 107 to 110, both inclusive, shall be observed.

CHAPTER VIII

DISPOSAL BY SALE

SECTION I.—GENERAL PROVISIONS

Disposal of State Lands by Sale.

Art. 136.—The provisions of the following Articles shall be observed in the matter of the disposal of State lands by means of sale.

Sales in Respect of Lots.

Art. 137.—Sales shall only be made in respect of the lots specified in Articles 53 (3) and 54 (3), in respect of lands held on lease in the case of the conversion of the leasehold contract into a contract of sale as permitted under Article 119, and also in respect of lands referred to in Article 158.

Sub-section 1.—Sales of the lots referred to in Article 53 (3) as well as that of the lands coming under Article 158 may only be effected after the respective plan has been prepared and the demarcation of the ground carried out.

Sub-section 2.—The sales of such lots (Article 53) must be so arranged that the State

shall always retain the ownership of alternate areas.

Sub-section 3.—Such lots shall not be subdivided for purposes of sale.

PRICE SALES DECLARED BY PUBLIC AUCTION.

Art. 138.—The price of sale of the lots specified in Articles 53 (3) and 54 (3) as well as that of lands coming under Article 158 shall be determined at the public auction, provided, however, that it shall never be less than 1,500 reis per hectare.

Sub-section.—The Governor-General may disallow the sale at the price obtained at the auction, and in such case he shall either order a new auction to be held on the basis of price which he may fix, or withdraw the sale of the lot or ground in question.

PRICE OF CONCESSIONS DETERMINED BY THE GOVERNOR-GENERAL.

Art. 139.—In the case of concessions permitted by Article 118 the price of sale shall, in terms of Article 53 (2) or Article 54 (4), be determined by the Governor-General on his own authority or subject to the deliberative vote of the Government Council as the case may by, provided that such price shall never be less than 1,500 reis per hectare, and that in its payment no account shall

be taken of the rents paid under the contract of lease.

Price to be paid in the Coin which is the Legal Tender in the Province.

Art. 140.—The price of sale, to be settled in the currency which is legal tender in the Province, may, at the option of the applicant, be paid for either in a lump sum or in annual and equal instalments covering a period not exceeding twenty years.

Sub-section 1.—In the case of payment being made in instalments, the amount thus owing becomes subject to interest at the rate of 4 per centum per annum, such interest being due together with the instalments payable each year.

Sub-section 2.—Concessionaires of land sold on the instalment principle are allowed the right to pay off any such instalment before it becomes due.

Until Full Payment has been made the State shall have Legal Mortgage on all Ground sold on the Instalment Principle.

Art. 141.—Until payment has been made in full the State shall have a legal mortgage of the ground sold on the instalment principle.

Such Lands cannot be Alienated.

Art. 142.—Until payment has been made in full concessionaires of lands sold on the instalment principle are expressly debarred from alienating such lands.

How Payments must be made.

Art. 143.—If payment of the price of sale is to be made in a lump sum, the amount thereof shall be paid into the Treasury Office within five days of the date of the public auction if in terms of Article 138, or of the publication of the decision granting the sale if in terms of Article 139; in the case of payment having to be made in instalments the first of such instalments shall be paid within that period, and each succeeding instalment together with annual interest in respect of all amounts due within each respective year reckoned from the date of the concession title.

Failure to pay Instalments and Interest.

Art. 144.—In case of non-payment of any instalment and interest up to the day on which such instalment and interest fall due, all subsequent instalments shall be held to have become due, and warrant for collection together with

certificate of registration of concession and of the relative mortgage shall within thirty days be sent to the delegate of the Crown Attorney in the respective judicial district, which delegate shall immediately apply for an order of execution to which are applicable the provisions of Article 949 and following Articles of the Code of Civil Procedure.

SECTION II.—PROCEDURE IN CONNECTION WITH CONCESSIONS BY SALE

Deposit to be made by Intending Bidder before the holding of an Auction.

Art. 154.—Concessions by sale of lands in terms respectively of Articles 53 (3) and 54 (3), and Article 158 shall be made in accordance with the procedure prescribed in Articles 71 to 81 inclusive, subject to modification in respect of the initial payment, which shall be replaced by the amount of 1,500 reis as prescribed in Article 138 or by that which the Governor-General may determine, as allowed him by the Sub-section of the said Article, such amount being multiplied by the area of the land applied for. This applies in respect both of the upset price at the auction and of the deposit to be made; a document showing that such deposit has been made must be put in

by the applicant and by any intending bidder before the time fixed for the holding of the auction.

Sub-section.—In the minute of the auction there shall be recorded the declaration of the highest bidder as to the mode of payment (as allowed him by Article 145) he prefers.

Conversion of Contract of Lease into one of Sale.

Art. 146.—The procedure in connection with the conversion permitted by Article 119 shall be as follows :—

(1) The mode of payment shall be stated in the application asking for the conversion of the contract of lease into one of sale ; to such applications there shall be annexed the title of lease and documents showing that all rentals and taxes have been paid up to date ;

(2) Deals with the procedure to be followed by the Survey Department in preparing the documents for submission to the Government Council or the Governor-General, as the case may be, whose decision is to be published in the issue next appearing of the *Boletim Official*, the page

on which such notification is printed being attached to the documents relating to the concession;

(3) Within five days of the date of the publication the concessionaire shall pay into the Treasury Office the price of sale if immediate payment is stipulated, or the first instalment if payment has been agreed to in this form, and shall likewise deposit with the Survey Department the cost of issue of title and its registration;

(4) The conditions stipulated above having been complied with, the respective title shall be issued, registered and delivered to the concessionaire;

(5) In case of non-fulfilment of such conditions, the documents relating to the concession shall immediately be submitted to the Governor-General for the purpose of the whole proceedings being declared void. In such a case the conversation shall never be allowed to the concessionaire;

(6) In case of divergency between the Governor-General and the Government Council the provisions of Sub-section 4 of Article 82 shall be observed;

(7) This states that when documents relating to any lease, the conversion of which is

desired, are filed at a District Survey Office, such office shall forward the said document to the Surveyor-General's Office, where the matter is to be dealt with ;

(8) All proceedings in connection with the provisions of this Article shall be completed within sixty days.

Art. 147.—The provisions of Sub-section 2 of Article 90 and those of Articles 107 to 110 are to be observed in connection with the matters specified in the two last preceding articles.

CHAPTER IX

This Chapter deals with concessions made in terms of Articles 53 (4) and 59, *i.e.*, concessions made to Administrative Corporations, Catholic Missions, and Benevolent, Charitable, and Educational Institutions, all of which must be of Portuguese nationality.

CHAPTER X

This Chapter contains certain modifications and explanations of the existing legislation on "Prazos da Coroa."

CHAPTER XI

Concession Titles.

Art. 160.—All concessions granted by the State, whatever form they may take, shall be duly titled.

Definition of Concession Titles.

Art. 161.—Titles of concession (Form P), save those mentioned in Articles 29, 30, and Sub-section 2 of Article 133, comprise four distinct parts:—

The first shall contain the charter or patent of concession signed by the Governor-General or the Governor of District, if within the latter's jurisdiction;

The second shall contain a plan of the property to which there shall be annexed a diagram with the geodetic co-ordinates showing precise situation and area;

The third is for purposes of recording all legal acts requiring registration in connection with the property;

The fourth is for purposes of making endorsements.

Preparation of Titles and their Delivery.

Article 162 and its Sub-sections deal with the preparation of titles and their delivery to con-

cessionaires. For each title a concessionaire shall pay 10,000 reis and in addition half this amount as fees.

Registration of Titles of Concession.

Art. 163.—All titles of concession save those mentioned in Articles 29, 30, and Sub-section 2 of Article 133 shall, before being delivered to the concessionaires, be registered in the respective Deeds Office.

Sub-section 1.—Such registration shall be effected on the requisition of the Survey Department or its respective District Office.

Sub-section 2.—This requisition, to be signed by the Surveyor-General or his District delegate, shall together with the respective title be delivered to the Deeds Office by an official of the Survey Office.

Sub-section 3.—Registration of the title having been duly made in the proper records of the Deeds Office, the Registrar shall immediately enter such registration on the third part of the title deed, together with the date, his signature, and the seal of his Department.

Sub-section 4.—This states that besides the fee due to him for registration, the Registrar of Deeds is to receive 400 reis for making the above entry.

Sub-sections 5, 6, and 7 deal with further procedure by the Survey Department and Deeds Office in connection with the registration of titles.

Titles constitute Complete Proof in Court of Law.

Art. 164.—Titles issued and registered in manner conforming to the provisions of the preceding Articles shall constitute complete proof in a Court of Law in respect of the property they relate to.

Transference of Title.

Art. 165.—Rights pertaining to any title of concession are transferable by endorsement subject to the authorization of the Governor-General.

Mode of Procedure.

Art. 166.—Such endorsement consists of a simple written declaration dated and signed by the owner of the title transferring the rights which it confers on him. This declaration is likewise to be signed by the transferee of the said rights.

Sub-section 1.—Besides the name of transferee, the endorsement shall contain mention of his age, whether single or

married, calling, place of birth and that of residence, and, in the case of a collective body, its title, domicile, and name of its representatives.

Sub-section 2.—If the person transferring or that acquiring such rights is unable to make his signature, a competent person shall sign in his place; those signing by proxy shall make a declaration to that effect.

Sub-section 3.—In case of incapacity of either party, his legal representative shall sign in his stead.

Sub-section 4.—In the endorsement mention shall be made as to whether the transference of rights is free of payment or has to be paid for, in the latter case the amount or price of such transference being specified.

Sub-section 5.—In the case of a transfer not embracing all rights conferred on the transferor by his title, the rights thus transferred shall be specified.

Sub-section 6.—In the case of the conditions of transfer involving a multiplicity of provisions rendering necessary their being embodied in a public deed, the endorsement shall contain mention of the respective notary, his domicile, date of deed, and

number and pages of the protocol in which such deed has been recorded.

Endorsement of Transference of Title.

Art. 167.—The endorsement shall always be made in the presence of the respective Registrar of Deeds, to whom the parties interested or their representatives shall present an application for the purpose on which the Governor-General must have recorded his permission, if no ground exist for its refusal.

Sub-section 1.—Before the endorsement is made the Registrar of Deeds shall assure himself as to the identity of the parties applying for the transfer if such parties are unknown to him, and likewise of their legal capacity to enter into the contract, demanding for this purpose all the necessary documents not only in compliance with the provisions of the present law and of the general legislation in force, but also in respect of the national law of the country to which any of the parties may be subject. The identity may be proved by means of the documents specified in Sub-section of Article 71.

Sub-section 2.—In case of the transferee being of foreign nationality the Registrar of

Deeds shall also demand that a declaration be made in terms of Article 57 (2), or being a society documents showing that it is legally constituted.

Sub-section 3.—The identity and capacity to act, as specified in Sub-section 1, having been proven, and proof having been given of the payment of the amount due in respect of the Registration Tax, the Registrar of Deeds shall immediately hand to the parties concerned vouchers for the payment of such stamp duty as would be payable if a deed of transfer had to be made.

Sub-section 4.—On presentation of duplicate voucher showing that such stamp duty has been paid, the Registrar of Deeds shall, if permission to effect the transfer has been allowed by the Governor-General, authorize the endorsement; further he shall record on his memorandum book the fact of the application referred to in this Article having been placed before him, make the registration of transfer in the proper place, and directly afterwards hand to the transferee the concession title with the necessary record of registration of transfer.

Sub-section 5.—If on presentation, for purposes of endorsement and registration, of a deed of transfer made in terms of Sub-section 6 of the last preceding Article the Registrar of Deeds have any doubts as to the identity or legal capacity of the parties concerned for purposes of the contract he may refuse to assent to such endorsement and registration, the grounds for such refusal being recorded on the application. From this decision appeal may be made in terms of Article 788 and following Articles of the Code of Civil Procedure.

Sub-section 6.—All documents put in by the parties concerned for purposes of proof of their identity and legal capacity, as well as the receipt relating to the payment of the Registration Tax and stamp duty in terms of Sub-section 3 above, shall be filed at the Deeds Office. Likewise there shall be filed all other documents relating to the contract and which in terms of the regulations in force have not to be returned to such parties.

Sub-sections 7 and 8 deal with the collection of fees due to the Registrar.

Transference through Death or on Account of Judicial Action.

Art. 168.—In the case of a property having to be transferred by reason of the death of the concessionaire, or on account of a judicial action, execution or any other circumstance in which the endorsement is not made or cannot be made by the transferer, the Registrar of Deeds shall, after recording the registration on the third part of the title deeds, make an entry in the fourth part with the following declaration : " This title becomes the property of (here follows the name of the new owner) by virtue of (reason of transfer)," such declaration being dated and signed by the said Registrar.

Legal Acts must be Registered.

Art. 169.—This Article prescribes that all further legal acts requiring registration be duly registered, signed, and sealed, without which they are of no effect.

Registrar of Deeds and the Surveyor-General's Action regarding any Change which may take Place in Connection with any Property.

Article 170 and its Sub-sections require the Registrar of Deeds and the Surveyor-General to

communicate to each other for purposes of registration any change which may take place in connection with any property.

Art. 171.—Whenever any registration renders necessary the cancellation of another registration or registrations previously made, the Registrar of Deeds shall, even if not requested thereto, effect such cancellation.

Cancellation of Registrations previously made.

Art. 172.—In case of a property having to be divided among heirs by reason of the death of its concessionaire or of its division being desired by any of its proprietors the following procedure shall be observed:—

(1) If those interested be agreed upon and it be possible to effect the division of the property, application thereto shall be made to the Governor-General, and such division shall be carried out in terms of Article 62 and its Sub-sections.

(2) In case of non-agreement and the division being possible (which latter circumstance may be proved by means of a certificate from the Surveyor-General), the terms of procedure shall be those prescribed in Article 568 and following of the Code of Civil Procedure, subject to the following modifications:—

(a) The appraisers shall be selected from among the technical staff of the Survey Department or from among Sworn Surveyors.

(b) In the technical work of division the appraisers shall adhere to the instructions published to that effect by the Survey Department, and all documents therewith connected shall be filed at the said Department.

(c) A detailed minute shall be drawn up of everything connected with the work of survey on the ground, and such minute shall be signed by every one connected with the carrying out of the said work.

(d) Deals with the drawing up of the minute referred to above and the delivery of all documents to the Court.

(e) Prescribes that the judicial authorities are to be present during the carrying out of the survey work only when requested thereto by any of the parties interested, who shall pay besides the respective fees and salaries, all board and travelling expenses.

(f) Such appraisers shall be paid by all the parties interested the above-mentioned expenses and a daily fee of 5,000 reis.

(g) The partition having been made and judgment of the Court delivered, the parties interested shall apply to the Governor-General requesting that he order the issue of new titles by the Survey Department, to which the provisions of Articles 162 and 163 shall be applicable. To the application must be annexed the title of concession and document containing the judgment of the Court.

(3) In case of non-agreement and the division of the property not being materially possible (which latter circumstance shall be proved by means of a certificate from the Surveyor-General), any of the proprietors may apply to the Judge of the respective Judicial Division to have a summons served on the parties interested in order that, in consultation, they decide to put any one of them in possession of such property or sell same by public auction in terms of Article 570 and its Sub-section of the Code of Civil Procedure.

Other Sub-sections of this Article state that the non-appearance of any of the interested parties on the day and hour designated by the

judge for the consultation is tantamount to non-agreement, and that if at such consultation any of those interested raise the question of "dominium" or exclusive possession this circumstance is to be recorded on the document embodying the results of the consultation, and thereafter the judge will direct those concerned to take proceedings in the ordinary way.

Loss or Destruction of Concession Titles.

Art. 173.—This Article and its Sub-sections deal with the question of the loss or destruction of concession titles and the issue of new titles in their stead. For this new title a payment is due of half the fee specified in Article 162 (9), plus 1,000 reis. Such new titles are to be delivered to the concessionaire within 90 days from the date of application therefor.

Refusal to produce Titles.

Art. 174.—Should an owner of a title disappear retaining such title or should any owner refuse to deliver his title for the purpose of registering or cancelling any legal act affecting the property, such as: seizure, attachment, charges or liabilities resting on the property, actions at law, etc., such registration or cancellation shall be carried out on production of such documents

as are required by the general legislation in force being produced.

Sub-section.—In case of any refusal as stated above a title may not be endorsed by the party concerned until in the third part of such title an entry has been made of all registrations and other records previously effected at the respective Deeds Office.

Title to Property passing from Original Owner through Action at Law or by Execution.

Art. 175.—If by virtue of an action at law or execution a property passes into the possession of another person, and it having been shown in the course of the legal proceedings that the whereabouts of the previous owner of the title are not known or that such owner refuses to deliver the said title, such title shall, in the respective judgment or decision of the Court before which the matter has been brought be declared of no effect in respect of the right which it may confer on its previous holder.

Sub-section 1.—On presentation of a certificate of such judgment or decision the party interested may apply for provisional registration of transfer and at the same

time make application to the Governor-General for a new title, which title shall be issued by the Survey Department in terms of Sub-section 6 and following of Article 173.

Sub-section 2.—This provides for the conversion of the provisional registration of transfer into a definite one on production of the new title to the Registrar of Deeds.

Penalty for the Non-delivery of Title.

Article 176 declares that an owner of a title who refuses, in any of the cases mentioned in the two last succeeding Articles, to deliver such title incurs the penalty provided by Article 187 of the Penal Code.

Refusal to produce Title in Court.

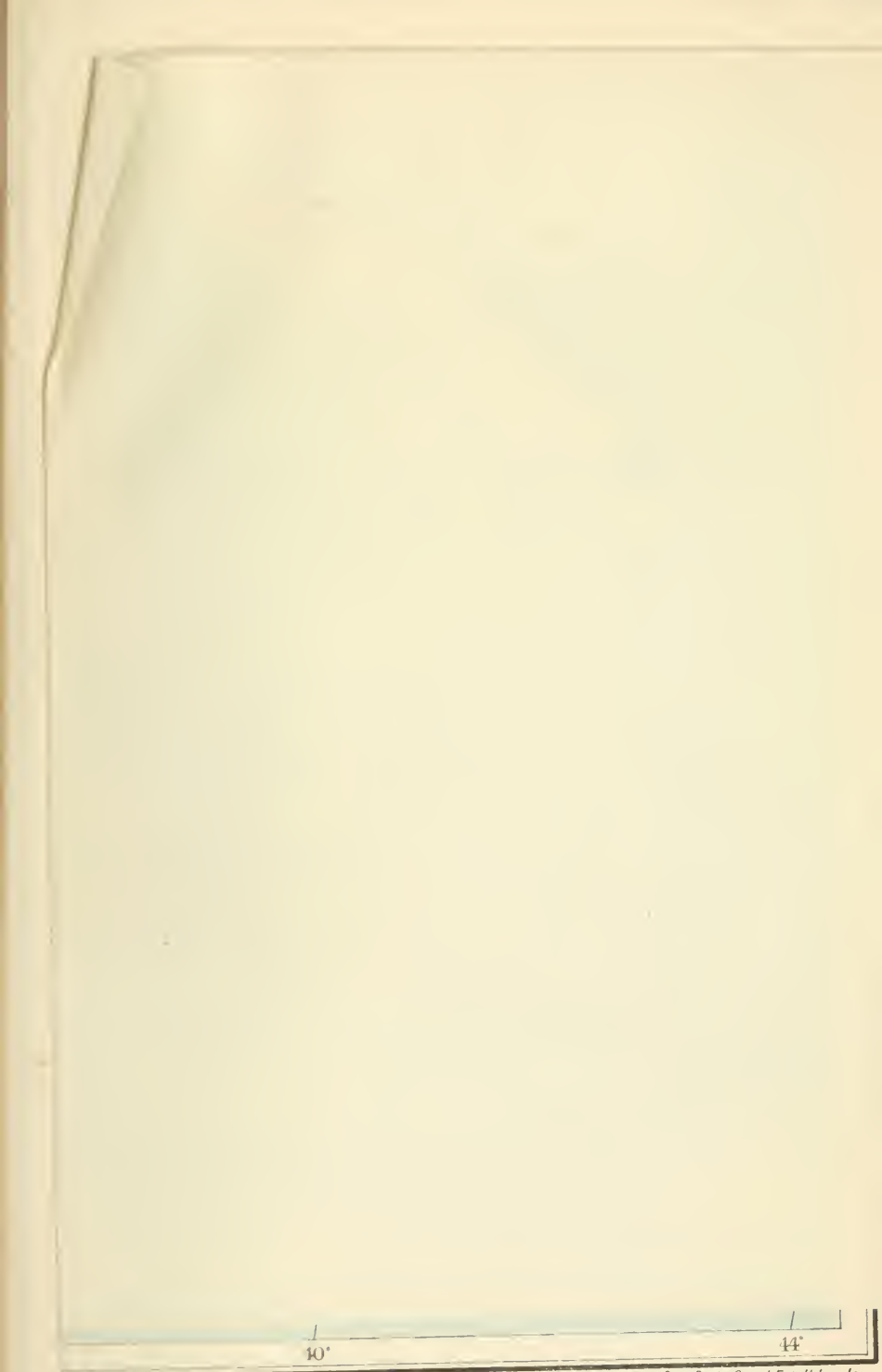
Art. 177.—If upon being duly notified an owner of a title refuses to produce such title in a Court of Law for purposes other than those of Articles 174 and 175 he shall become subject to the provisions of Article 211 of the Code of Civil Procedure.

Art. 178.—This states that except in certain specified cases titles are supposed to be in the possession of the respective owner.

AMENDMENT TO ARTICLE 216

The *Boletim Official* of May 27, 1911, published a Decree of the Central Government dated April 15, 1911, reducing the amount of the value of improvements enabling occupiers of land without legal title to acquire the quitrent titles to such ground irrespective of public auction. This alteration, which modifies the provision of Article 216 of the Land Law, is as follows :—

> Occupiers of ground to whom Article 216 of the Land Law (Provisional) of the Province of Mozambique refers may apply, irrespective of public auction, for the granting of such ground on quitrent, provided they have duplicated the value of the ground thus occupied by means of improvements, such value to be reckoned in terms of Article 51, Sub-section 1.



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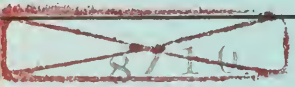

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